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Defining Measures of Emergency Care Access in Low- and Middle-Income Countries: A scoping review

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> Title: Defining Measures of Emergency Care Access in Low- and Middle-Income Countries: A scoping review

Short Title: Access measures of emergency care in LMICs

Authors

Sarah Hirner, MS (1)

Jyotshila Dhakal (2)

Morgan C Broccoli (3)

Madeline Ross (4)

Emilie Calvello Hynes (4)

Corey B Bills (4)*

- 1. University of Colorado, School of Medicine, Aurora CO
- 2. University of Colorado Denver, Denver CO
- 3. Brigham and Women's Hospital, Department of Emergency Medicine, Boston MA
- , îne, L 4. University of Colorado, School of Medicine, Department of Emergency Medicine, Aurora, CO

*Corresponding Author

Corey B Bills

(ORCID: 0000-0002-3456-6008)

University of Colorado

School of Medicine

Department of Emergency Medicine

Leprino Building, 12401 E 17th Ave, Aurora CO 80045

Email: Corey.bills@cuanschutz.edu

Phone: 9174148899

Abstract

Objectives: Estimates suggest that over 50% of annual deaths in low and middleincome countries (LMICs) could be averted by implementation of high-quality emergency care systems. In order to better understand and address relevant barriers to accessible emergency care, we performed a scoping review of all English language, peer-reviewed publications related to measures of access and emergency care in LMICs.

Participants: 68 full text articles

Interventions: A search of PubMed, Embase, Web of Science, and the gray literature were queried. English language studies describing one or more measure(s) of access to emergency or acute care health services in LMICs were included.

Outcomes: A structured data extraction tool was used to identify and classify access measures into one of five categories: affordability, availability, accessibility, accommodation, and acceptability. Quantitative outcomes related to various components of emergency care access were summated and reference ranges provided.

Results: A total of 2865 articles were screened with 68 meeting full study inclusion criteria. Articles were uniformly descriptive (n=68, 100%), but heterogenous in their definitions of access, reporting a total of 131 unique measures. The majority of total measures studied (n=306; with many unique measures studied more than once) described availability (n=107, 35.0%) most often. Unique and total measures of affordability were the least reported (n=17, 13.0%; n=30, 9.8%, respectively). While measures of accessibility made up 17 (13.0%) of unique measures, these measures were disproportionately studied in total (n=63, 20.6%).

Conclusions: Numerous measures of emergency care access are described in the literature, but most studies on access are limited in scope, address only the availability of and/or the accessibility to emergency care. Development and standardization of key measures to best understand and address these gaps and allow comparison across systems is essential in efforts to achieve meaningful, universal access to high-quality emergency care in all settings.

Strengths and Limitations

- Globally, more than 8 million people die each year from preventable causes with 40% attributable to a lack of healthcare access.
- Implementation of and access to high quality emergency care could lead to significant reductions in death in low- and middle-income countries (LMICs).
- The available literature on access to emergency care is significant, but measures are limited in scope and not previously studied in detail.
- Though multiple measures were revealed through this review, several measures such as patient proximity to emergency units, are overly studied and may not actually guarantee access to emergency care.
- Development and standardization of key measures to best understand and address gaps in the current literature on emergency care access will allow for comparison across systems and allow for meaningful approaches to ensuring universal access to high-quality emergency care in all settings.



Introduction

The past 20 years have been called a golden age of public health. (1) A dramatic increase in global health funding has expanded health care resources in low- and middle-income countries (LMICs). (2-4) As a result, significant reductions in infectious disease-related, neonatal, and maternal mortality have been achieved in line with the United Nations Millennium Development Goals. (5) Further reductions in global mortality attributable to non-communicable diseases and trauma has been far less substantial. (6) While a shift from disease specific programs to health system strengthening, equity, and social protection has been an important first step, progress on current Sustainable Development Goals remains lacking and has been further hampered by existing health inequities made worse by the COVID-19 pandemic. (7)

Improvements in both prehospital and facility-based emergency care have the potential to impact many of the SDGs, lead to marked improvements in healthcare systems, and reduce deaths across multiple disease categories.(8) Estimates suggest that 54% of annual deaths in LMICs could be averted by the implementation of quality emergency care systems. (9-12) The increasing mortality burden of non-communicable diseases, including injury and chronic conditions, coupled with the acute medical needs of emerging pandemics, such as SARS-CoV-2, requires the integration of emergency care, with longitudinal care services, to treat exacerbations of chronic disease.(1, 13, 14) Unfortunately many who live in resource-limited settings lack access to quality emergency care.

Previous descriptions of known measures of emergency care quality (15, 16) and barriers to emergency care access (17, 18) have highlighted gaps in emergency

> care in LMICs, but no comprehensive review on measures of emergency care access in LMICs has been completed to date.

The term "access" is often used as shorthand for distance, leading to a focus on individual patient proximity, either spatial or temporal, to a given health service. (19) While vital, proximity is but one component of accessibility and may not correlate with the true ability to receive quality emergency care. For this scoping review of all English language peer-reviewed literature related to access and emergency care in LMICs, we revert back to a more expansive definition of access, one rooted in a rights-based approach to emergency care and reflecting the spectrum of fit between user and service and inclusive of five dimensions of access—availability, accessibility, accommodation, affordability, and acceptability as described by Penchansky and Thomas.(Table 1; 20-22)

	all English language peer-reviewed literature	
emergen	cy care in LMICs, we revert back to a more e	expansive definition of access,
one roote	ed in a rights-based approach to emergency	care and reflecting the
spectrum	of fit between user and service and inclusive	e of five dimensions of
access-	-availability, accessibility, accommodation, af	fordability, and acceptability—
as descri	bed by Penchansky and Thomas.(Table 1; 2	20-22)
	Proposed Emergency Care Access Measure	es for Monitoring, Evaluation
and Com	parative Analysis by Access Type	Proposed sample emergency care access
Access Type	Definition from Penchansky and Thomas	
Access Type Availability	Definition from Penchansky and Thomas The relationship of the volume and type of existing services to the clients' volume and types of needs	Number of emergency care beds per (patient catchment) population Presence of drug, technology, or interventions specific to EU care Presence of emergency care facility designation Presence of emergency care clinicians 24 hours a day Percent of clinicians with emergency care training (as per local authority)
	The relationship of the volume and type of existing services to the clients' volume and types	measures Number of emergency care beds per (patient catchment) population Presence of drug, technology, or interventions specific to EU care Presence of emergency care facility designation Presence of emergency care clinicians 24 hours a day Percent of clinicians with emergency care

Accommodation	The relationship between the manner in which the supply resources are organized to accept clients (including appointment systems, hours of operation, walk-in facilities, telephone services) and the clients' ability to accommodate to these factors and the clients' perception of their appropriateness	Hours of operation of emergency unit Number of transfers per patient Average wait time Training provided per specific task(s)
Acceptability	The relationship of clients' attitudes about personal and practice characteristics of existing providers, as well as to provider attitudes about acceptable personal characteristics of clients	Understanding of how to navigate emergency medicine system Acceptability of emergency unit care Acceptability of provider conduct or attitudes Acceptability of ambulance use

Materials and Methods:

Search Strategy

A rigorous search strategy was employed with the goal of identifying all peerreviewed studies that described measures of access to emergency care in LMICs. We performed a scoping review using the following databases: PubMed, Embase, and Web of Science. A subsequent gray literature search was conducted via Google, with searches targeted towards organizations thought to publish global emergency care literature.

The initial search strategy (Supplementary Material: Appendix 1) was developed within PubMed and adapted for the remaining databases. Search terms included various iterations of access, emergency care, and LMICs. Free text terms and standardized MeSH headings/subheadings were utilized to optimize sensitivity for relevant literature while minimizing excess search results. The reference lists of relevant primary studies and reviews likely to meet inclusion criteria were also reviewed manually to both verify search sensitivity and identify other potentially relevant studies that were not identified by the electronic search.

Studies published between January 1, 1990, and December 30, 2020, English-language, and describing at least one measure of access to emergency care services in an LMIC (by World Bank economic definitions) were included. Articles were excluded that were clearly irrelevant to the topic, did not involve emergency care, did not describe a measure of access or measurable barrier to emergency care, or did not include data from at least one LMIC. For the purposes of this review, we did not include data on care seeking in the setting emergency obstetric and newborn care (EmONC; we anticipate a separate forthcoming review on the subject). This review was exempt from ethics review based on the corresponding author's IRB.

Patient and Public Involvement

Given the nature of this study it was not possible to involve patients or the public in the design, or conduct, or reporting, or dissemination plans of our research.

Data Processing

 Citations meeting initial broad search criteria were imported into Covidence (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia) and duplicates removed. Initial title and abstract review were performed by two independent authors (SH, JD). Disagreements were resolved by a third reviewer (CB). The same procedure was followed for full text review.

Data from included manuscripts were extracted by the primary author and included the following: author(s) and full citation, publication date and study timeframe, location, study type, setting, methodology, access measure(s) reported, and the primary outcome(s). Countries under study were categorized by World Bank income-level, WHO region, whether the study was local, regional, national or multinational in scale, and whether the populations under study were rural or urban.

Data Analysis

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Individual access measures were aggregated and categorized by access type as defined by Penchansky and Thomas into the following five groupings: affordability, availability, accessibility, accommodation, and acceptability. (20) In Penchansky and Thomas' framework, access is examined through the "fit" of the patient with the health care system. For example, a health care facility may be available (that is, it exists), but not accessible because of transportation barriers. In addition, the health care facility may not have necessary measures to accommodate a patient (such as 24-hour-access or childcare), may be unaffordable, or may be unacceptable (i.e., due to poor quality or corruption). We further analyzed measures of access via the 'Three Delay' model and the World Health Organization's Emergency Care Systems framework and categorized measures as addressing the process of patient's seeking, reaching, or receiving care. (9, 24)

All total extracted access measures were collected, with similar measures collapsed into singular unique measures. We report the number of unique measures and the total number of times a measure is reported as a number and percent. Given the heterogeneity of study methods and types, a qualitative analysis and narrative synthesis was undertaken. Thematic analyses focused on the number and general quality of the measures used. Trends and ranges among studies with comparable numeric measures are reported where appropriate. We did not perform a grading of the literature given the overall observational nature of most studies. Criteria proposed by the Preferred Reporting Items for Systematic Reviews and Metaanalyses Extension for Scoping Reviews statement were adhered to in reporting.(25) Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, Al training, and similar technologies.

Results

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A total of 2865 articles were identified for screening via database searches, and 29 were included from the gray literature and hand searches of relevant literature (**Figure 1**). After removal of 865 duplicates, 1860 articles were screened by title and abstract, 176 articles met criteria for full text screening, after which 108 articles were excluded. In sum, 68 articles met full criteria for inclusion. (Supplementary Material, eTable 1)

[Insert] Figure 1. Prisma Flow Diagram for review of literature on access to emergency care measures in LMICs.

All 68 studies were published in peer-reviewed journals. The majority (n=39, 57.4%) of studies examined access related to routine emergency care, 20 (29.4%) were relevant to prehospital care, eight (11.8%) were specific to trauma care, and one (1.5%) article focused on pediatric patients. (**Table 2**) Geographically, publications included data from all six WHO regions, with the majority from the African Region (n=35, 51.5%). The majority of included studies originated from lower-middle income countries (n=34, 50.0%), with additional studies from upper-middle income countries (n=13, 19.1%) and low-income countries (n=11, 16.2%). Ten articles (14.7%) included data from multiple income groups.

 Table 2. Characteristics of manuscripts for study inclusion

Characteristic	N (%)
	N=68
Country	
Multinational	10 (14.7)
Ghana	7 (10.3)
Pakistan	6 (8.8)
Kenya	5 (7.4)
India	5 (7.4)
South Africa	4 (5.9)
Brazil	3 (4.4)
Other*	27 (39.7)
WHO Region	

2		
3	Africa	35 (51.5)
4	Americas	7 (10.3)
5	Eastern Mediterranean	4 (5.9)
6	European	1 (1.5)
7	•	
8	South-East Asia	16 (23.5)
9 10	Western Pacific	1 (1.5)
10	Multiple WHO Regions	4 (5.9)
12	Income level	
13	Low	11 (16.2)
14	Lower-middle	34 (50.0)
15	Upper-middle	13 (19.1)
16	Multiple	10 (14.7)
17	Settings	
18	Local	8 (11.8)
19	Regional	31 (45.6)
20	National	19 (27.9)
21	Multinational	10 (14.7)
22		10 (14.7)
23	Setting if Local or Regional**	
24	Urban	6 (8.8)
25 26	Rural	31 (45.6)
20	Both	2 (2.9)
28	Article Type	
29	Quantitative	19 (27.9)
30	Qualitative	49 (72.1)
31	Methodology	
32	Descriptive (Survey)	9 (13.2)
33	Descriptive (Interview)	13 (19.1)
34	Cross sectional	41 (60.3)
35	Mixed methods	5 (7.4)
36	Observational pre/post; Cohort,	
37	RCT	0 (0.0)
38		
39 40	Population focus	20 (57.4)
40	General EM care	39 (57.4)
42	Prehospital care	20 (29.4)
43	Trauma care	8 (11.8)
44	Pediatrics	1 (1.5)
45	Number of study participants	
46	0-50	5 (7.4)
47	51-100	2 (2.9)
48	101-500	7 (10.3)
49	501-2000	1 (1.5)
50	>2000	6 (8.8)
51	Not reported	47 (69.1)
52		
53	*At least one study from the following	countrios including Do

*At least one study from the following countries including Bangladesh, Cambodia, Cameroon, China, Eswatini, Ethiopia, Guinea-Bissau, Haiti, Honduras, Iran, Nigeria, Rwanda, Sierra Leone, Sudan, Tanzania, Thailand, Vietnam, Yugoslavia, Zambia, Zimbabwe

**N= 39

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Methodologically, all studies were descriptive and relied on surveys (n=9, 13.2%), interviews (n=13, 19.1%), or cross-sectional (n=41, 60.3%) data. No manuscript reported a comparator group, and the majority of studies were qualitative in nature (n=49, 72.1%). Studies varied in the number and type (patients, clinical providers, administrators) of participants. The majority of studies (n=41, 60%) used cross-sectional data and did not specify the number of participants. Participant enrollment ranged from 11 to 32,774 individuals. The types of health facilities under study also varied, and included emergency care as accessed at clinics, district hospitals, referral hospitals (with access to intensive care), and more formal emergency departments.

Measures by access type

In sum, 131 unique measures of access were described in the 68 studies (**Table 3**). Of the 68 total studies, most (n=49, 72.1%) reported more than one unique measure. Based on Penchansky and Thomas' categories of access, the most unique number of measures reported were those describing accommodation (n=41, 31.3%) followed by availability (n=39, 29.8%). In many instances, a single unique measure was studied or reported more than once leading to a total of 306 total measures cited. Among the total measures, availability (n=63, 20.6%) represented a disproportionate number as compared to the overall unique measures of availability reported (n=17, 13.0%).

Table 3. Unique and total number of access measure categorized by accesstype

Access category N (%) of unique measures N (%) of total measures N=131 N=306

Availability	39 (29.8)	107 (35.0)
Accessibility	17 (13.0)	63 (20.6)
Accommodation	41 (31.3)	58 (19.0)
Affordability	17 (13.0)	30 (9.8)
Acceptability	17 (13.0)	48 (15.7)

Availability

A total of 39 unique measures on availability were reported in the studies included in this review. Total measures of affordability were studied most often (n=107, 35.0%, **Table 4**). Of the unique measures, most (n=28, 71.8%) focused on receiving care. Measurements on receiving care often measured the presence or lack of basic emergency health facilities and resources relevant to emergency care. There was heterogeneity when describing resource service availability, such as the availability of emergency radiologic services (e.g., CT and MRI) and emergency laboratory service (e.g., blood smears for malaria). Measures owing to the presence or absence of clinical providers with qualifications relevant to emergency care were described in 9 of the 68 studies (13.2%).

Table 4. Unique access measures categorized by access type and process of care.

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2 3 4	Table 4. Unique access measures	s categorized by access typ	e and process of care.	-2022-0678 /right, inclu	
5	Availability N=39 Accessibility N=17		Accommodation N=41	Affordab	Acceptability N=17
Seeking 7 N=22	N=2	N=3	N=5	N=1	N=11
8 9 10 11 12 13 14 15 16 17 18 19 20	Presence of community (lay) responders (56) Presence of dispatchers (62)	Patient access to a telephone (5, 10, 57) Presence of a national universal toll-free emergency number (5, 8, 9, 12, 13, 26, 41, 56, 66) Median time from onset of patient symptoms to contact with provider (12, 53)	Ability to get through on phone lines on first attempt (5) Concerns over personal safety in seeking care (23) Patients and families responsible for arranging their transportation to the higher-level facility (13) Presence of adequate child care (9) Required paperwork filled out before emergency care (12)	n 1754 pril 2023. Downloaded from http to Enseignement Superieur (ABES) f for the seignement superieur (ABES) to text and data mini	Acceptability of EU care: by sex (19); by education level (21); age (Age<15, 21; Age>40, 44); economic/financial status (149); social status (12); insurance (12); appearance (12); ethnicity (55); religion (55, 66), proximity to health facility (49) Awareness of emergency care systems and services (10, 48) Community accepts and utilizes EMS care (56) Fear of emergency dental treatment (44) Knowledge of emergency number (20, 25, 48, 53, 66) Knowledge of where the closest EU facility is located (48) Personally knew a healthcare provider (12, 55) Preference of traditional methods of care (e.g., bonesetters) over EU care (7) Social and family disapproval (49) Understanding of how to navigate emergency care systems; general (5, 13, 21, 54) Understanding of what qualifies as an emergency condition/perception that condition is severe enough to seek care (7, 21, 48, 49, 66)
20 _{Reaching} 21 ^{N=45}	N=9	N=12	N=12	N=8 g	N=4
21 N 45 22 23 24 25 26 27 28 29 _{N=45} 30 31 32 33 34 35 36 37 38 ^{Receiving}	Basic building (i.e., structural) resources specific to emergency care (24) EU radio/communication devices available for EMS handoff (28) Fuel available for ambulances (13) Fuel for general (non-ambulance) transport (13) Presence of any healthcare facility (13) Presence and number of ambulances with basic life support capabilities (43) Presence and number of ambulances without medical capabilities/transport only (48) Presence and number of helicopters for transport (62)	Dispatcher training provided (5) Geography limits access: rural locations (1); mountainous terrain (9) Calculated accessibility by 2SFCA method (22) Calculated accessibility by 2SFCA method (22) Percent of patients who sought care or made it to a facility within 60 minutes of onset of symptoms (54) Percent of patients who sought care or made it to a facility within 60 minutes of onset of symptoms (54) Response time from initial call to scene (3, 6, 13, 20, 33, 57, 64) Roadways limits access: traffic (1); poor or narrow roads (10, 13, 18, 48) Transport time from a location to a facility with specific EU capabilities (i.e., PCI-capable hospital, trauma center, obstetric emergencies, tertiary hospital; 34, 42, 45, 51) Transport time from scene to hospital (2, 34, 43, 45, 47, 50) Travel distance (in km; 12, 13, 19, 20, 21, 25, 30, 47, 53, 54, 60, 65, 66) Travel time from home to national ambulance service station (61) Weather/Climate limits access: rainy season (10)	EMS delays: general (23); due to referrals (54) Existence of a coordinated emergency response system (8, 26, 65, 66, 41) Equitable (plan for) distribution of ambulance stations (57) Facilities are notified in advance of patients arriving (14) General maintenance issues with vehicles (10) Number of separate modes of transportation (per patient) to reach care at facility (18) Patients taken to the police station before taking them to the hospital (12, 13) Percent of missed or prolonged pick-ups due to prehospital provider misunderstanding of location (5) Percent of missed or prolonged pick-ups due to prehospital provider misunderstanding of location (5) Presence of drivers willing to respond to patient request (10) Private ambulance services control rooms linked to cellular networks (62) Regulations governing EMS (41) Transfer to a facility that has the capability to handle the case (18)	N=8 Ambulance fee (25, 53) Ambulance fee (25, 53) Ambulance rearral fee (25) Cost of transport (10, 113, 17, 20, 44, 665 Payment required barre treatment (32) Preauthorization fee (38) Preauthorization fee (38) Preauthorizatio	Ambulances acceptable based on: language (57), if police involved/transport (57), slow response time (48) Patient preference of ambulance care over other forms of transport (48) Prehospital care acceptable to: those taking government ambulance (52), those being transferred for medico-legal reasons (52) Previous ambulance use and willingness to use ambulances in the future (57)
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45 46 47

hours, 48)

transfer (13)

coverage (16)

53)

(5)

1		
2 _{N=64} 3	Absolute number of EU providers (stratified by type: physicians, nurses, and EMS providers; 5, 9, 12, 13, 16, 28)	Number of (trauma) fatalities within and outside the first hour (64)
	Advanced cardiac life support or resuscitation equipment available	Fatality rate per patient kilometer from facility (64)
4	in ambulances or number of ACLS ambulances (26, 28, 43, 52) Availability of basic EU medications available (12, 14, 44, 46)	
5	Availability of basic EU resources/equipment (8, 12, 13, 16, 18, 24, 28, 46, 65, 66)	
6	Availability of EU infection control materials (24)	
7	Availability of EU procedures: Needle thoracostomy (14); chest tube (14); pelvic binding (14), defibrillation (14), cardioversion (14),	
8	pericardiocentesis (14); external cardiac pacing (14); Blood	
9	transfusions (14, 30) Availability of EU specific supplies and equipment: Suture and	
10	wound care supplies (14); Gloves (14); Oxygen (14); Stethoscopes (18); Glucometer (14); Pulse oximetry; ECG machine (14);	
11	Resuscitation equipment (7)	
12	Availability of imaging (Xray: 14; CT: (28,62), ultrasound, MRI: 28) Availability of laboratory/diagnostic testing material (general	
13	blood/urine tests: 28, 30, 53; malaria smears: 30) Availability of potable (sterile) water (18)	
14	Availability of pre-hospital providers with standardized training (8,	
15	20, 26, 48, 52) Availability of specified care: trauma care (4); orthopedic (fracture)	
16	care (7, 14, 14); obstetrical emergencies (18); HIV care (18); cholera (18); tuberculosis care (18); general surgical services (18);	
17	dental care (18); critical care (18); ophthalmological care (18)	
	Electricity available (18, 24) Emergency equipment list available (18)	
18	First aid received on scene by lay providers (i.e., members of the	
19	public, other motorists, or the less injured casualties; 32) First aid received on scene by trained providers (32)	
20	Number of doctors staffing EU (appropriate for size; 62) Number of EU-specific area beds (18)	
21	Number of hospital-facility (non-EU specific) rooms or beds (9, 17,	
22	53) Presence of EU resuscitation bed/zone (46)	
23	Presence of EU (within facility; 2, 62)	
24	Presence of EU dedicated nursing personnel (16) Presence of facility burn unit (2)	
25	Presence of triage (12, 13, 46) Staff gualified to utilize EU equipment (24)	
26	Staff qualified to treat EU conditions (25)	
27	Staff with EC training: ACLS or BLS training (28, 65, 66); ATLS, PALS (28, 66)	
28	Staff with specialized training relevant to EC: adult critical care (16); continuing education (16); EU equipment use (18); neonatal	
29	care (46)	
30		
31		
32		

specific procedures (28,46) Presence of a standardized EMR (12) Protocols for patient transfers (18) Protocols specific to trauma care (14) Safe passage for health providers to the hospital at night (66) Staff comfort in treating EU conditions (30, 32) Training for community members and police: First aid and triage (66)

Additional staffing for disasters (62)

Availability of 24-hour ambulance care (no night

Availability of 24-hour emergency care (12, 24,

Availability of 24-hour staff availability (18) Care provided during transport (13) Care provided at lower-level facility before

Legal protections for ambulance providers distributing and providing care (26) Miscommunication or mis-triage of patient acuity

Number of transfers per patient (5) Number and Percent mis-triage (5) Percent of hospitals with out-of-hours clinician

Training for providers: adult triage (16) Training for providers: EU-specific (12, 13, 25, 43, 65) Training for providers: pediatric triage-specific (16)

Physician comfort in adequately performing EU-

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Time to lab tests (68); by patient GCS (68) Time to provider (e.g., wait time; 23, 68) Utilization and access to standardized clinical care guidelines: general approach (14); condition specific (sepsis, DKA, anemia, 14)

Acceptable providers conduct and attitudes towards patients (12, 13, 53) Providers/percent of providers deemed corrupt (12)

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Accessibility

Unique measures of accessibility totaled 17 (13.0%), with a disproportionate number of measures studied more than once, leading to 63 total measurements (20.6%). The majority of the unique measures of accessibility corresponded to the process of reaching care (n=12, 70.6%) with most measures on the distance or time to a health service (n=11, 64.7%). Among the 13 studies reporting time, travel times to emergency care ranged from 5 minutes to 2 hours. The range of distances to health facilities demonstrated similar variability, though most (n=13) measurements were in kilometers. An additional study (n=1) reported on the percentage of the population living within a given distance or time, while other studies (n=4) reported on a range of distances or times to specific EU care (e.g., trauma, referral, cardiac). Other qualitative barriers to accessibility were also provided, including the effects of terrain, weather, and road quality.

Accommodation

Measures of accommodation made up the greatest number of unique measures (n=41, 31.3%), but they were rarely studied more than once (total n=58, 18.6%). Adequacy of child care, concerns over personal safety, and difficulties in getting through to prehospital providers were described as significant barriers in the process of seeking emergency care. The majority of unique measures on accommodation dealt with the process of receiving care (n=24, 58.5%). Among measures categorized as receiving care, facility-based measures (n=10) included measures of provider timeliness and availability, provider training, and of protocols for care. Among the unique measures of accommodation, four (8.9%) described the use standardized protocols (three related to prehospital care and one on facility-based care).

Affordability

Measures of affordability were the least studied. While the 17 (13.0%) unique measures were similar to accessibility and acceptance, measures were rarely studied more than once (n=30, 9.8%). Of the unique metrics reported, most reported on different aspects of the cost of transportation in reaching care (n=8, 47.1%) and the cost of receiving treatment (n=5, 29.4%). Types of costs varied, including cost of an ambulance ride, cost of deposit before treatment, and total hospital bills. A single study described the lack of emergency care affordability based on lost wages from missing work.

Acceptability

Seventeen (13.0%) unique measures of acceptability were described in the literature. The majority were related to the process of care seeking (n=11, 64.7%). Measures largely described patient's understanding, acceptability, willingness, and fears in activating and navigating emergency care systems.

Access measures by frameworks of emergency care

Individual metrics were mapped to the Three Delay model, and categorized as either, seeking, reaching, or receiving care. Based on this framework, the majority of access measures described the processes of receiving care (n=64, 48.9%). Measures were also mapped to the WHO emergency care systems framework. Roughly equal proportions of measures were focused on prehospital (n=61, 46.6%) and facility-based emergency care (n=63, 48.1%). A total of 8 (6.1%) unique measures were neither specific to prehospital nor facility-based care.

Discussion

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Increased global access to quality emergency care has the potential to reduce mortality associated with non-communicable illness and trauma as well as infectious disease and pregnancy related complications.(9-12) Analyzing emergency care access measures in detail has the potential to elucidate gaps in health system—made worse by the Covid-19 pandemic—that can guide strategies to address existing inequities in care. To date, this is the first review of access measures specific to emergency care in LMICs.

This review revealed several common themes. The majority of unique emergency care access indicators focus on availability and accommodation, but total measures of accessibility appear to be more frequently described in the literature. This has led to the disproportionate emphasis on distance and time to a health facility as demonstrative of emergency care access. In reality, upon arrival to a health facility with an emergency condition, most patients are met with limited, ineffective, or non-existent emergency care provision. Relative to other categories of access reviewed, measures of affordability were the least studied in the literature. These measures often lacked information to contextualize data relative to the gross domestic product of the study population's cost of living. Cost is known to play a significant role in patient's overall healthcare access in LMICs (26), and costs associated with emergency health services are known to vary widely across health systems. (27, 28) Moreover, cost-effectiveness is a widely used method to inform resource allocation, yet evidence on the cost-effectiveness of emergency care interventions and emergency care systems in LMICs remains limited. (27) Measures of access included in this study included both direct (user fees, medication costs, laboratory and imaging tests) and indirect (lost wages, travel costs). Further research

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Further consensus led efforts to determine measures most important for system comparison are necessary.

The WHO Emergency Care System Framework provides another structured approach with which to understand the current gaps in emergency care access measures. Prehospital and facility-based measures of access were equally represented on the literature, though significant gaps remained in both domains. Among prehospital care, most measures focused on the transfer process, with less focus on dispatch and provider response.

Considerably fewer studies described measures related to the EU reception process (e.g., registration, screening, and triage) or the transfer of care between prehospital and facility-based providers. Additionally, no measures described the process of EU disposition or transfer of care to the inpatient ward. Though disposition, transfer, referrals, and transition of care from one provider to another are often cited as times of higher risk to patients, measures of this risk were not adequately described in this study.(29)

This study makes an initial attempt to describe measures of access to emergency care, but it is restricted in scope and possesses several limitations. First, there was no attempt made to rank-order measures based on importance or the degree to which they relate to specific patient outcomes. We recognize that not all measures have equal utility, with some better reflecting access to care issues and serving as more significant correlates of patient outcome. Second, though the actual corresponding outcome measures were collected (and described in Supplementary Material, eTable 2), given the heterogeneity of measures and limitations of the search strategy we were unable to

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provide reference standards for any of the access measures described. Other fields have attempted, at times with similar difficulty, to establish reference (e.g., the Lancet Commission on Global Surgery has recommended a maximum two-hour travel time to surgical services), but very few agreed upon standards exist for measuring access to emergency care globally. (30) As an example, the historical reference to the 'golden hour' concept remains controversial.(31) Third, the global emergency care access literature has yet to widely adopt a standard list of measures. The lack of consensus on what measures could or should be instituted makes facility, regional, and national comparisons difficult. Limited resources and a lack of clarity around important metrics limits effective understanding of care. (32) Similar to previous consensus work on measures of emergency care quality in LMICs, future efforts should aim to define a core list of indicators of access to emergency care.(16)

Conclusion

Increasing access to quality emergency care is a key step in strengthening heath systems in LMICs. This scoping review demonstrates that while existing literature examines a wide breadth of access metrics, many gaps remain in our understanding of emergency care access in LMICs. As researchers continue to examine access and barriers to emergency care, special attention should be paid to those dimensions of access less commonly examined, such as affordability. Standardized, consensus-based measures of emergency care access should be developed to allow for more universal comparisons of healthcare functions.

Author Contributions

- CB, ECH, and SH contributed to the conception and design of the work
- SH and JD contributed to data collection.
- SH and CB contributed to data analysis and interpretation and drafting of the article.
- MB, MR, and ECH contributed to critical revisions of the article.
- All named authors have approved of the version to be published and agreed to be accountable for all aspects of the work.

Competing Interests: Nothing to declare

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and its online supplementary material.

Ethics: Ethical approval for this type of study is not required by our institution.

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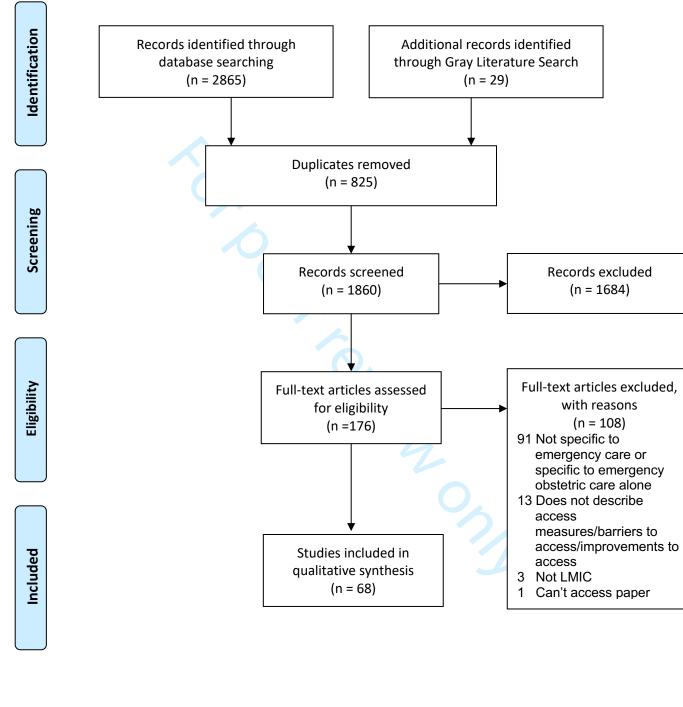
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Figure 1. Prisma flow diagram for review of literature on measures of access to emergency and acute care in low- and middle-income countries.



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8 9		MO, Adejumo AO, Ademiluyi SA. Ambulance services of Lagos state, Nigeria: a six-year (2001-2006) audit. West Afr J Med. 2012;31:3–7.				Nigeria			7 Apr En	sectional	2006		
10	Ahmed	Ahmed S, Adams AM, Islam R, Hasan SM, Panciera R.		South-Eas	tlower-middle	Dhaka,	Regional	Urban	rilant Enseigr	Cross	2014	not	not
11		Impact of traffic variability on geographic accessibility to 24/7 emergency healthcare for the Urban poor: A GIS study in		Asia		Bangladesh			023 Igne	sectional		specified	specified
12		Dhaka, Bangladesh. PLoS One. 2019;14(9):e0222488.							13. 13.				
	Ali	Ali M, Miyoshi C, Ushijima H. Emergency medical services in	Pakistan		tlower-middle		Regional			Mixed	2000-	not	not
14 15		Islamabad, Pakistan: a public-private partnership. Public Health. 2006;120:50–7.		Asia		Pakistan			n Sul	methods	2001	specified	specified
15 16	Alibhai	Alibhai A, Hendrikse C, Bruijns SR. Poor access to acute	Multinational	African	N/A	N/A	International	N/A	t perel an rie	Descriptive	2016	392	conference
17		care resources to treat major trauma in low- and middle- income settings: A self-reported survey of acute care						1	ried fr	Survey			delegates
	• •	providers. Afr J Emerg Med. 2019;9(Suppl):S38-S42.							<u> </u>				
18 19	Anest	Anest T, Stewart de Ramirez S, Balhara KS, Hodkinson P, Wallis L, Hansoti B. Defining and improving the role of	South Africa	African	upper-middle	Cape Town, South Africa	Regional	Urban		Descriptive Interview	2013	24	interviewed individuals
20		emergency medical services in Cape Town, South Africa.				Couli Anda			n Spi	Interview			Individuals
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	, ,	hypothetical accessibility challenges for emergency services.				, South Africa	•		jope	sectional		specified	specified
23 2 4	Aries	Jamba. 2019;11(2):681. Ariës M, Joosten H, Wegdam H, van der Geest S. 2007.	Ghana	African	low	Brong Ahafo	Local	Urban		Mixed	2005	46	patients
25	/ 1100	Fracture treatment by bonesetters in central Ghana: patients		/ infoan		Region,		Urban u	n qual	methods	2000	10	pationto
26		explain their choices and experiences. Tropical Medicine & InterNational Health 12(4): 564–574.				central Ghana	a	,	an <mark>i</mark> .c				
	Bachani	Bachani AM, Botchey I, Paruk F, Wako D, Saidi H, Aliwa B,		African	lower-middle	Kenya	National			Cross	2011	not	not
28		et al. Nine-point plan to improve care of the injured patient: A case study from Kenya. Surgery. 2017;162(6S):S32-S44.	L.						on Ju	sectional		specified	specified
29													
3 0 31	Bast	Bast HE, Jenkins JL. Challenges to Prehospital Care in Honduras. Prehosp Disaster Med. 2018;33(6):637-9.	Honduras	Americas	lower-middle	Honduras	National		rechn	Descriptive Interview	2018	not specified	not specified
3 2 0	Bhopal	Bhopal SS, Halpin SJ, Gerein N. Emergency obstetric	Sierra Leone	African	low	Kambia	Regional	Rural	,⊉025 at	Mixed	2013	not	not
33		referral in Rural Sierra Leone: what can motorbike ambulances contribute? A mixed-methods study. Matern				region, Sierra Leone		e e)25	methods		specified	specified
34	.	Child Health J. 2013;17:1038–43.											
	Bigdeli	Bigdeli M, Khorasani-Zavareh D, Mohammadi R. Pre- hospital care time intervals among victims of road traffic	Iran	Eastern Mediterran	upper-middle	Urmia, Iran	Regional	Urban	quant	Cross sectional	2005- 2007	not specified	not specified
36 37		injuries in Iran. A cross-sectional study. Bmc Public Health.		ean					enc	300101101	2007	specified	specified
20	Broccoli	2010;10. Broccoli MC, Calvello EJ, Skog AP, Wachira B, Wallis LA.	Kenya	African	lower-middle	Konva	National	N/A	Ö a DDai	Descriptive	2015	528	focus group
39	DIOCCOII	Perceptions of emergency care in Kenyan communities	Kenya	Anican		Renya	National	11/7	B bliographique	Interview	2015	520	members
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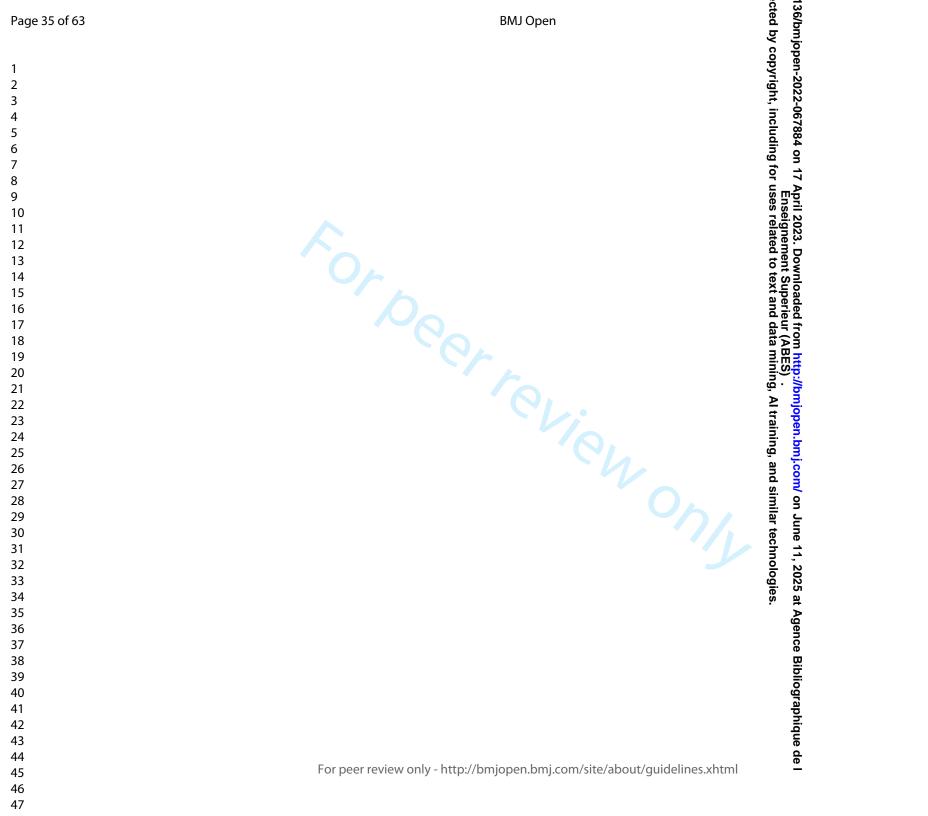
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5 6 ₁₄		Zambian communities lacking formalised emergency medicine systems. Emerg Med J. 2016;33(12):870-5. Burke TF, Hines R, Ahn R, Walters M, Young D, Anderson	Konyo	African	lower-middle	Mootorp	Pagional	Both	including	Descriptive	2013-	60	kov
7 8		RE, et al. Emergency and urgent care capacity in a resource-limited setting: an assessment of health facilities in western Kenya. BMJ Open. 2014;4(9):e006132.	Kenya	African	lower-middle	Kenya	Regional	DOIN	17 / for u	Interview	2013- 2014	00	key informants
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12 ₆ 13	Coyle	2019;9(2):77-80. Coyle RM, Harrison HL. Emergency care capacity in Freetown, Sierra Leone: a service evaluation. BMC Emerg	Sierra Leone	African	low	Freetown, Sierra Leone	Regional	Urban	n ment to	Cross sectional	2015	not specified	not specified
14 15 ⁷ 16	De Wulf	Med. 2015;15(1):2 DeWulf A, Otchi EH, Soghoian S. Identifying priorities for quality improvement at an emergency Department in Ghana. BMC Emerg Med. 2017;17(1):28.	Ghana	African	lower-middle	Urban Ghana		Urban	/nleaded Superier text and	Descriptive Survey	5-Jul	18	EU staff members
1 7 8 18	De Wulf	De Wulf A, Aluisio AR, Muhlfelder D, Bloem C. Emergency Care Capabilities in North East Haiti: A Cross-sectional Observational Study. Prehosp Disaster Med.	Haiti	Americas	low	the Fort Liberté district, Haiti	Regional	Rural	मि प्रम data	Cross sectional	2012	not specified	not specified
19 209 21	El Tayeb	2015;30(6):553-9. El Tayeb S, Abdalla S, Van den Bergh G, Heuch I. Use of healthcare services by injured people in Khartoum State, Sudan. InterNational Health. 2015;7(3):183-9.	Sudan	Eastern Mediterrar ean	lower-middle	Sudan	Regional	Urban	httlæ//br BESy . mining, /	Descriptive Survey	2010	not specified	not specified
22 ₀ 23 24	Elbashir	Elbashir K, Gore RJ, Abuaaraki T, Roblin P, Botha M, Yousif M, Ostrovskiys G, Bloem C, James SA. Prehospital emergency care and injury prevention in Sudan. Afr J Emerg		African	low	Sudan	National	N/A	//bmj gpen.bm g, Al training, ar	Cross sectional	2008 - 2014	not specified	not specified
25 ₁ 26 27	Emerick	Med. 2014;4:170–3. Emmerick IC, Luiza VL, Camacho LA, Ross-Degnan D. Access to medicines for acute illness in middle income countries in Central America. Rev Saude Publica.	Multinational	Americas	N/A	Central American Countries	International	Both	om ^a com∕ gcom/	Cross sectional	2013	2,761	interviewed households
28 29 ² 30	Hashtarkha ni	2013;47(6):1069-79. Hashtarkhani S, Kiani B, Bergquist R, Bagheri N, VafaeiNejad R, Tara M. An age-integrated approach to improve measurement of potential spatial accessibility to	Iran	Eastern Mediterrar ean	upper-middle	Mashhad City, Iran	Regional	Urban	ini quant	Cross sectional	2016	not specified	not specified
31		emergency medical services for Urban areas. Int J Health Plann Manage. 2020;35(3):788-98.		can					11,				
32 33 34		Hodkinson PW, Pigoga JL, Wallis L. Emergency healthcare needs in the Lavender Hill suburb of Cape Town, South Africa: a cross-sectional, community-based household	South Africa	African	upper-middle	Lavender Hill suburb of Cape Town,	Regional		2 g 2 g 2 5 10 g ies.	Descriptive Survey	2018	2754	interviewed individuals
35 36 37	Hsia	survey. BMJ Open. 2020;10(1):e033643. Hsia RY, Mbembati N/A, Macfarlane S, Kruk ME. Access to emergency and surgical care in sub-Saharan Africa: the infrastructure gap. Health Policy Plan. 2012;27(3):234-44.	Multinational	African	N/A	South Africa Ghana, Kenya, Rwanda,	International	N/A	Agence	Cross sectional	2012	not specified	not specified
38 39						Tanzania and Uganda			e Biblio				
40 41 42									Bibliographique de l				
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1 2									136/bmjopen-2022-06788				
3 ₂₅ 4 5	Jacobs	Jacobs B, Men C, Sam OS, Postma S. Ambulance services as part of the district health system in low-income countries: a feasibility study from Cambodia. InterNational Journal of Health Planning and Management. 2016;31(4):414-29.	Cambodia	South-East Asia	lower-middle	Cambodia	National	N/A Urban	2206788	Descriptive Interview	2013	not specified	not specified
6 ₂₆ 7	Khan	e e e e e e e e e e	Yugoslavia	European Region	upper-middle	Kosovo	Local	Urban	4 gan 17 1 gan 17	Cross sectional	2002	not specified	not specified
8 9 ²⁷ 10 11	Khan		Pakistan	South-East Asia	lower-middle:	Aga Khan University Hospital, Karachi,	Local	ā	April 20 Enseig	Cross sectional	1998- 2005	not specified	not specified
12 ₈ 13 14	Kirsch	Kirsch T, Hilwig W, Holder Y, Smith G, Pooran S, Edwards R. 1995. Epidemiology and practice of emergency medicine in a developing country. Annals of Emergency Medicine		Americas	lower-middle	Pakistan Port of Spain Trinidad and Tobago	, local	Urban 2	023. Bownlo	Descriptive Interview		not d specified	not specified
15 ₉ 16 17	Kumar	Trauma care - a participant observer study of trauma centers at Delhi, Lucknow and Mumbai. Indian J Surg. 2009;71:133–	India	South-East Asia	lower-middle	Delhi, Lucknow and Mumbai, India		Urban	a beried and	Cross sectional	2009	not specified	not specified
18 19 20	Levine	Davis MA. Understanding barriers to emergency care in low- income countries: view from the front line. Prehosp Disaster	Ethiopia	African	low	Tigray, Ethiopia	Regional		l fronBhttp://b ur (ABES) .	Descriptive Survey	2006	not specified	not specified
21 22 ¹ 23	Luo	Med. 2007;22(5):467-70. Luo W, Yao J, Mitchell R, Zhang X. Spatiotemporal access to emergency medical services in Wuhan, China: accounting for scene and transport time intervals. Int J Health Geogr. 2020;19(1):52	China	Western Pacific	upper-middle	Wuhan, Chin	aRegional	Urban	quant	Cross sectional	2020	not specified	not specified
24 25 ² 26	Macharia	Macharia WM, Njeru EK, Muli-Musiime F, Nantulya V. Severe road traffic injuries in Kenya, quality of care and access. Afr Health Sci. 2009;9(2):118-24.	Kenya	African Region	lower-middle	Kenya	National	N/A y	jopen.hanj.com	Cross sectional	1997- 1998	not specified	not specified
2 3 3 28	Mahmood	Mahmood KT, Amin F, Ayub H, Yaqoob M, Zaka M. Management of the patient from the site of accident to the hospital/ pre-hospital care. J Pharm Sci Res. 2010;2:804–8.	Pakistan	South-East Asia	lower-middle	Pakistan	National		on utant	Cross sectional	2010	not specified	not specified
29 ₄ 30 31 32	Mathew	Mathew A, Abdullakutty J, Sebastian P, Viswanathan S, Mathew C, Nair V, et al. Population access to reperfusion services for ST-segment elevation myocardial infarction in Kerala, India. Indian Heart J. 2017;69 Suppl 1(Suppl 1):S51-	India	South-East Asia	lower-middle:	Kerala, India	Regional	Urban N/A	ine 11,	Cross sectional	2017	not specified	not specified
335 34 35 36 37	Mock	S6. Mock C, nii-Amon-Kotei D, Maier R. 1997. Low utilization of formal medical services by injured persons in a developing nation: health service data underestimate the importance of trauma. The Journal of Trauma: Injury, Infection, nd Critical Care 42(3): 504–513.	Ghana	African	lower-middle	Ghana	National		2025 at Agence	Descriptive Interview	1995	21105	interviewed individuals
386 39 40 41 42	Mock	Mock C, Ofosu A, Gish O. 2001. Utilization of district health services by injured persons in a Rural area of Ghana. The InterNational Journal of Health Planning and Management 16: 19–32.	Ghana	African	lower-middle	Ghana	National	N/A	∍ ∰bliographique de l	Descriptive Interview	1995	9442	interviewed individuals
43 44 45 46 47		For peer review or	lly - http://b	omjopen.b	mj.com/site	/about/guid	lelines.xhtn	nl	e de l				

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1 2									mjopen-2022				
3 ₃₇ 4 5 6	Mock	Mock C, Nguyen S, Quansah R, Arreola-Risa C, Viradia R, Joshipura M. 2006. Evaluation of trauma care capabilities in four countries using the WHO-IATSIC Guidelines for essential trauma care. World Journal of Surgery 30: 946–956.	Multinational	N/A	N/A	Mexico, Vietnam, India, Ghana	interNationa			Descriptive Interview	2006	not specified	not specified
738 8 9 10	Mohan	Mohan B, Bansal R, Dogra N, Sharma S, Chopra A, Varma S, et al. Factors influencing prehospital delay in patients presenting with ST-elevation myocardial infarction and the impact of prehospital electrocardiogram. Indian Heart J. 2018;70 Suppl 3(Suppl 3):S194-S8.	India	South-Eas Asia	tlower-middle	Punjab, India	Regional	Urban	quant quant April 2 Ense for uses r	Cross sectional	2015	619	patients
1 3 9 12 13	Mould- Millman	Mould-Millman NK, Oteng R, Zakariah A, Osei-Ampofo M, Oduro G, Barsan W, et al. Assessment of Emergency Medical Services in the Ashanti Region of Ghana. Ghana Med J. 2015;49(3):125-35.	Ghana	African	lower-middle	Ashanti Region of Ghana	Regional		2023. Dow	Cross sectional	2012	not specified	not specified
1 4 0 15 16 17	Mould- Millman	Mould-Millman NK, Rominski SD, Bogus J, Ginde AA, Zakariah AN, Boatemaah CA, et al. Barriers to Accessing Emergency Medical Services in Accra, Ghana: Development of a Survey Instrument and Initial Application in Ghana. Glob Health Sci Pract. 2015;3(4):577-90.		African	lower-middle	Accra, Ghana	a Regional		wਜ਼ੋoaded froਜ਼ਿ It Superieur (휴) text and data	Cross sectional	2013	468	survey participants
1 8 1 19 20	Mould- Millman	Mould-Millman NK, Dixon JM, Sefa N, Yancey A, Hollong BG, Hagahmed M, et al. The State of Emergency Medical Services (EMS) Systems in Africa. Prehospital and Disaster Medicine. 2017;32(3):273-83	MutiNational	African	N/A	N/A	International		nini BES)	Cross sectional	2013- 2014	not specified	not specified
21 ₂ 22 23	Nagata	Nagata T, Takamori A, Kimura Y, Kimura A, Hashizume M, Nakahara S. Trauma center accessibility for road traffic injuries in Hanoi, Vietnam. J Trauma Manag Outcomes. 2011;5:11.	Vietnam	South-Eas Asia	tlower-middle	Hanoi, Vietnam	Regional	Urban	<u> </u>	Cross sectional	2006	not specified	not specified
2 4 3 25 26	Nielsen		Multinational	N/A	N/A	13 LMICs in Africa, Asia, and Latin America	International		jopen,∰mj.co gmj.co	Descriptive Survey	2009– 2010	not specified	not specified
274 28 29	Ntabaye	Ntabaye MK, Scheutz F, Poulsen S. 1998. Household survey of access to and utilization of emergency oral health care services in Rural Tanzania. East African Medical	Tanzania	African	lower-middle	Rungwe district in Mbeya region	Regional		<u>n</u> S	Descriptive Survey	1998	1,106	interviewed individuals
3Q ₅ 31 32 33	Ouma	Journal 75(11): 649–653. Ouma PO, Maina J, Thuranira PN, Macharia PM, Alegana VA, English M, et al. Access to emergency hospital care provided by the public sector in sub-Saharan Africa in 2015: a geocoded inventory and spatial analysis. Lancet Glob Health. 2018;6(3):e342-e50.	MutiNational	African	N/A	in Tanzania N/A	International	N/A	June 11, 2025 lar technologi	Cross sectional	2018	not specified	not specified
34 ₆ 35 36 37	Pigoga	Pigoga JL, Joiner AP, Chowa P, Luong J, Mhlanga M, Reynolds TA, et al. Evaluating capacity at three government referral hospital emergency units in the kingdom of Eswatini using the WHO Hospital Emergency Unit Assessment Tool. BMC Emerg Med. 2020;20(1):33.	Eswantini	African	lower-middle	Eswantini	National	N/A	add Agence	Cross sectional	2018	11`	key informants
38 ₇ 39 40 41	Radjou	Radjou AN, Mahajan P, Baliga DK. Where do I go? A trauma victim's plea in an informal trauma system. J Emerg Trauma Shock. 2013;6:164–70.	India	South-Eas Asia	tlower-middle	Puducherry territory, India		Urban	Brographique de l	Cross sectional	2009- 2010	not specified	not specified
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			Pakistan		stlower-middle	,	Regional	Urban 📑	i q ig i	Descriptive	2001	not	not
4		services and cultural determinants of an emergency in Karachi, Pakistan. Prehospital Emergency Care 5(3): 312–		Asia		Pakistan		nci	671	Interview		specified	specified
5		Arachi, Pakistan. Prenospital Emergency Care 5(3): 312– 316.						ua	7884				
	Ro	Ro YS, Shin SD, Jeong J, Kim MJ, Jung YH, Kamgno J, et	Cameroon	African	lower-middle		Regional	Urban	qgal	Cross	2017	658	interviewed
7		al. Evaluation of demands, usage and unmet needs for emergency care in Yaounde, Cameroon: a cross-sectional				Cameroon		ltor		sectional			households
8		study. Bmj Open. 2017;7(2).						, L					
	Rocha	Rocha TAH, da Silva NC, Amaral PV, Barbosa ACQ, Rocha	Brazil	Americas	upper-middle	 Brazil 	National	N/A Ses		Cross	2017	not	not
10		JVM, Alvares V, et al. Addressing geographic access barriers to emergency care services: a National ecologic						ſe	i 20	sectional		specified	specified
11		study of hospitals in Brazil. Int J Equity Health.							2023.				
12		2017;16(1):149.											
		Rocha TAH, da Silva NC, Amaral PV, Barbosa ACQ, Rocha		Americas	upper-middle) Brazil	National	N/A Ö	Deant	Cross	2017	not specified	not
14		JVM, Alvares V, et al. Access to emergency care services: a transversal ecological study about Brazilian emergency						ex	vnload t Super	sectional		specified	specified
15		health care network. Public Health. 2017;153:9-15.						i a	ad				
			India		clower-middle	e Mumbai, India	aLocal	Urban <mark>d</mark>	ත් සිට	Cross	2005	170	patients
17		Vaishnav PD, Vatkar A. Where there are no emergency medical services-prehospital care for the injured in Mumbai,		Asia				dau	from ur (Al	sectional			
18		India. Prehospital Disaster Med. 2010;25:145–51.						<u>بة</u> =					
	Scolari	Scolari GAS, Rissardo LK, Baldissera VDA, Carreira L.	Brazil	Americas	upper-middle	e Brazil	National	N/A Min		Descriptive	2018	not	not
20		Emergency care units and dimensions of accessibility to						'n		Survey		specified	specified
21		health care for the elderly. Rev Bras Enferm. 2018;71 Suppl†2:811-7.						ıg, А	br				
2 <u>2</u> 4	Siddiqui	Siddiqui M, Siddiqui SR, Zafar A, Khan FS. Factors delaying	Pakistan		stlower-middle		Local).	Cross	2006-	165	patients
23		hospital arrival of patients with acute stroke. J Pak Med		Asia		Pakistan		a		sectional	2007		
24 25 ⁵		Assoc. 2008;58:178–82. Sodemann M, Biai S, Jakobsen MS, Aaby P. Knowing a	Guinea-	African	low	Guinea-	Local	raining Urbang	aBant	Descriptive	2001	1572	children
		medical doctor is associated with reduced mortality among	Bissau	Anioan		Bissau	LUUU.	ە		Interview	200.	1072	ormaro
26		sick children consulting a paediatric ward in Guinea-Bissau,						and	i <mark>č</mark>				
27 256		West Africa. Trop Med Int Health. 2006;11(12):1868-77. Stein C, Mould-Millman NK, De Vries S, Wallis L. Access to	MutiNational	African	N/A	N/A	N/A			Cross	2015	not	not
20		out-of-hospital emergency care in Africa: Consensus	With Nationa.	Allican	N/A			N/A Similar		sectional	2010	specified	specified
29		conference recommendations. Afr J Emerg Med.											- 1
30 2.57		2016;6(3):158-61. Sultan M, Abebe Y, Tsadik AW, Ababa A, Yesus AG, Mould-	Ethionia	African	low	Ethionia	National	N/A C	ne	Cross	2017	429	2117/01/
51		Millman NK. Trends and barriers of emergency medical	ΕίΠιομια	Allican	low	Ethiopia	National	N/A N/A	<u>, </u>	cross sectional	2017	429	survey participants
32		service use in Addis Ababa; Ethiopia. BMC Emerg Med.						010	2025				pu
33 258	C	2019;19(1):28. Suriyawongpaisal P, Atiksawedparit P, Srithamrongsawad S,	Thelland	O suth Ear	· middle	Thailand	Mational	👅	יי ט <i>ז</i>	0	0047	00 006	tionto
51		Thongtan T. Closing the Equity Gap of Access to Emergency		South-East Asia	stupper-middle	Inalianu	National	N/A S	-	Cross sectional	2017	20,206	patients
35	·	Departments of Private Hospitals in Thailand. Emerg Med		/ 1010					Agen	0000000			
36		Int. 2018;2018:6470319.		С. () Б ал					en				
-		Suriyawongpaisal P, Aekplakorn W, Srithamrongsawat S, Srithongchai C, Prasitsiriphon O, Tansirisithikul R.	Thailand	South-East Asia	stupper-middle	Thailand	National	N/A	q g al	Mixed methods	2012	not specified	not specified
20	•	Copayment and recommended strategies to mitigate its		Asia					Bib	Hiotrioac		specifica	specifica
39		impacts on access to emergency medical services under							vlio				
40		universal health coverage: a case study from Thailand. BMC Health Serv Res. 2016;16(1):606.							gra				
41		Health Serv Res. 2010, 10(1).000.							Bibliographique de l				
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3 ₆₀ 4 5	-	Access to Emergency Services in Low- and Middle-Income Countries: A GIS-Based Analysis. PLoS One.	Multinational	N/A	N/A	N/A	International	N/A , Including N/A	36/bmjopen-20229067884	Cross sectional	2015	not specified	not specified
6 ₆₁ 7 8	Tansley	Lewis D, et al. Population-level Spatial Access to Prehospital Care by the National Ambulance Service in Ghana. Prehosp		African	lower-middle	Ghana	National	G	q g ant 17	Cross sectional	2016	not specified	not specified
9 ₆₂ 10	Thomson	Emerg Care. 2016;20(6):768-75. Thomson N. Emergency medical services in Zimbabwe. Resuscitation. 2005;65(1):15-9.	Zimbabwe	African	lower-middle	Zimbabwe	National	N/A B		Cross sectional	2005	not specified	not specified
11 ₆₃ 12 13		Treleaven E, Pham TN, Le DN, Brooks TN, Le HT, Partridge JC. Referral patterns, delays, and equity in access to advanced paediatric emergency care in Vietnam. Int J Equity Health. 2017;16(1):215.		South-East Asia	lower-middle	Hanoi, Vietnam.	Local	5		Cross sectional	2013	557	patients
14 64 15	Vanderschu ren	Vanderschuren M, McKune D. Emergency care facility access in Rural areas within the golden hour?: Western	South Africa	African	upper-middle	South Africa	Regional	Rural R	nt Superieur (AE	Cross sectional	2015	not specified	not specified
16 1 ⁹⁵ 18	Wen	Cape case study. Int J Health Geogr. 2015;14:5. Wen LS, Char D. Existing infrastructure for the delivery of emergency care in post-conflict Rwanda: an initial descriptive study. Acad Emerg Med. 2011;18:S243.	Rwanda	African	low income	Kigali, Rwanda	Regional	Urban	ederron	Mixed methods	2007	60	health care workers
1 9 6 20 21	Wesson	Wesson HK, Stevens KA, Bachani AM, Mogere S, Akungah D, Nyamari J, Masasabi Wekesa J, Hyder AA. Trauma Systems in Kenya: a qualitative analysis at the district level. Qual Health Res. 2015;	Kenya	African	lower-middle	Kenya	Regional	Urban		Descriptive Interview	2011	not specified	not specified
207 23 24 25	Zaidi	Zaidi SM, Labrique AB, Khowaja S, Lotia-Farrukh I, Irani J, Salahuddin N, et al. Geographic variation in access to dog- bite care in Pakistan and risk of dog-bite exposure in Karachi: prospective surveillance using a low-cost mobile phone system. PLoS Negl Trop Dis. 2013;7(12):e2574.	Pakistan	Eastern Mediterran ean	lower-middle	Karachi, Pakistan	Regional	Urban A		Cross sectional	2009- 2011	not specified	not specified
2 6 8 27 28 29	Zimmerman	Zimmerman A, Fox S, Griffin R, Nelp T, Thomaz E, Mvungi M, et al. An analysis of emergency care delays experienced by traumatic brain injury patients presenting to a Regional referral hospital in a low-income country. PLoS One. 2020;15(10):e0240528.	Tanzania	African	low	Tanzania	Regional	Urban	quant	Cross sectional	2013- 2017	3209	patients
30Local (sin	gle hospital), al (multilple c	Regional (town, city or multiple hospitals) vs National (through	hout the coun	try) vs									
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eTable 2. Individual access measures and outcomes by article.

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eference	Author (year)	Measures	Outcomes
	Adewole	1. Geographic barriers	1. Rural population has less access, traffic impedes access
	Ahmed	Percent of slums that have	Percent of slums that have
		1. 1 EU per 50,000 population	1. 12%
		2. 1 burn unit per 50,000 population	2. 0%
		Percent of population that lives	Percent of population that lives
		3. Within 60 minutes of EU	3. 63%
		Within 60 minutes of burn unit	4. 32%
	Ali	 Average response time to accident 	1. 10 min
	Alibhai	1. Resource issues	 LMICs have less resources for trauma care
	• •		τ
	Anest	1. Training issues	1. Dispatchers lack training
		2. Staffing issues	2. Shortages of physicians and EMS providers
		3. Hospital system issues	 Errors in triage, lack of childcare for other children in the bound participation of clinic approximation metric.
		4. Pre-hospital system issues	transfers
		5. Communication issues	Lack of transportation Lack of telephone access and S
		6. Barriers to reaching care	4. Lack of transportation, Lack of telephone access and no
			Universal emergency number.
			 Difficulty getting through on phone lines, miscommuniet regarding the aguity of the patient misunderstanding of
			regarding the acuity of the patient, misunderstanding of.
			6. Community understanding of how to navigate the health
			system and emergency conditions
			 Dispatchers lack training Shortages of physicians and EMS providers Errors in triage, lack of childcare for other children in the household and restrictive hours of clinic operations, matrix transfers Lack of transportation, Lack of telephone access and bouriversal emergency number. Difficulty getting through on phone lines, miscommunicative regarding the acuity of the patient, misunderstanding geography and distance Community understanding of how to navigate the health system and emergency conditions b scene of 5-7 minutes 8-10 minutes 30-45 minutes
		, <u> </u>	State Stat
	Anyumba (2019)	1. Drive time from University of Venda Clinic	o scene of 1. 5-7 minutes
		accident	2. 8-10 minutes o
		2. Drive time Tshilidzini Hospital to scene of	ccident 3. 30-45 minutes
		3. Drive time from Donald Frazer hospital to	cene of
		accident	
	A .:		
	Aries (2007)	1. Reason that patients do not seek hospital	are 1. Lack of specialized fracture treatment
		2. Barrier to prehospital care	2. Lack of resuscitation equipment
		3. Cost of treatment by a bonesetter	3. Average 13 € (range 0–60 €) 4. 300 € (range 25–800 €)
		4. Cost of hospital treatment	
		5. Barrier to seeking care	5. Opinion that bonesetters have more expertise.
		Demographics associated with seeking here	
	Deeber: (0047)		treated in a hospital.
	Bachani (2017)	1. Training issues	Lack of training of pre-hospital and in-hospital provide
		2. Resource issues	Z. Lack of pasic nospital equipment
		3. Pre-hospital system issues	3. There was no functioning emergency number or coord
	Post (2010)	1 Stoffing incurs	response system. 1. Lack of sufficient room and staffing 2. Access to facilities is limited by mountainous terrain.
	Bast (2018)	1. Staffing issues	1. Lack of sufficient room and staffing
		 Geographic issues Secondary financial strain 	 Access to facilities is limited by mountainous terrain. Not having adequate child care, the inability to miss work being too ill to walk. Lack of a universal EMS access code. Poor roads, rainy season inaccessibility, no mobile phone coverage, patient must buy petrol and pay driver, Awareness of ambulance service Drivers willing to respond, maintenance issues hospital for 17.1 vs. 6.3 minutes When patients were dressed well, had a good attitude and the service of the second s
		 Secondary financial strain Pre-hospital system issues 	 being too ill to walk
		T. ITETIOSPILAI SYSLEIII ISSUES	A Lack of a universal EMS access code
	Bhopal (2013)	1. Barriers to seeking care	 Lack of a universal EMS access code. Poor roads, rainy season inaccessibility, no mobile phane
		 Barriers to seeking care Pre-hospital system issues 	coverage, patient must buy patrol and pay driver
		2. 1 10-1103pilai system issues	Awaraness of ambulance sonico
			2. Drivers willing to respond, maintenance issues
			2. Drivers willing to respond, maintenance issues hospital for 1. 17.1 vs. 6.3 minutes nts to access 1. When patients were dressed well, had a good attitude a g
	Bigdeli (2010)	1. Mean transport times from the scene to the	hospital for 1, 17.1 vs. 6.3 minutes
		interurban incidents compared to city area	
	Broccoli (2015)	 Characteristics that made it easier for patients 	nts to access 1. When patients were dressed well, had a good attitude
		care	showed patience, had personal financial resources or
		2. Barrier to care	insurance or personally knew a healthcare provider
		3. Training issues	2. Many providers were unfriendly towards patients or
		4. Transportation issues	 showed patience, had personal financial resources or insurance or personally knew a healthcare provider Many providers were unfriendly towards patients or unmotivated to provide care. Participants were also concerned about corruption. Healthcare providers lack training in the basics of emergency care.
		5. Health system issues	concerned about corruption.
		6. Financial issues	3. Healthcare providers lack training in the basics of
		7. Pre-hospital system issues	emergency care.
		8. Communication issues	4. Difficulty obtaining transportation, long distances required
		9. Staffing issues	for travel.
		10. Resource issues	5. Lack of emergency care after business hours, required
			paperwork before emergency care is provided and poor
			medical records systems, lack of triage
			6. High cost of treatment.
			7. Officers take patients to the police station before taking
			them to the hospital, creating delays.
			8. Unavailable emergency phone lines
			o. Onavailable entergency profile illies

				Lack of healthcare provider Lack of resources and critical medications at facilities Lack of accessible healthcare facilities No functional emergency phone number Lack of necessary equipment No standard national protocols for mass casualty incident no triage	BN
1					5
2					P D
3			9.	Lack of healthcare provider	ň
4			10.	Lack of resources and critical medications at facilities	firs
5					ž
613	Broccoli (2016)	1. Barrier to care	1.	Lack of accessible healthcare facilities	ď
7		2. Communication issues	2.	No functional emergency phone number	is
8		 Resource issues Health system issues 	3. 4.	No standard national protocols for mass casualty incident	Sec.
9		5. Staffing issues		no triage	as
10		6. Training issues	5.	Staff shortages	2
11		 Barrier to reaching care Transportation issues 	6. 7	Lack of specific training in emergency care	4
12		9. Financial barriers	8.	The time it takes for transportation to arrive, lack of fue for	r 136
13		10. Systems issues that generate delays	•	vehicles and poor road conditions	br
14		11. Barriers to seeking care	9. 10	Money was a barrier when trying to obtain transportation	<u>ק</u>
15			10.	prior to receiving healthcare, which creates delays.	<u>b</u> e
16				Transferring patients to a higher-level facility with no care	٥Ĩ,
17				stabilisation at the lower-level facility or during transport.	202
18				transportation to the higher-level facility.	2-0
19			11.	Lack of community knowledge about medical emerger	s 67
20				Staff shortages Lack of specific training in emergency care The distance to travel to reach a facility The time it takes for transportation to arrive, lack of fue vehicles and poor road conditions Money was a barrier when trying to obtain transportation Certain patients are required to be seen at the police stati prior to receiving healthcare, which creates delays. Transferring patients to a higher-level facility with no cere stabilisation at the lower-level facility or during transport Patients and families are responsible for arranging the transportation to the higher-level facility. Lack of community knowledge about medical emergence and emergency care. Participants felt that facility staff action at the lower to power	884
21				bad attitudes, and thought they should be quicker to period emergency care.	ğ
22				ō	17 ו
284	Burke (2014)	Percent of Level 2 and 3 Trauma facilities that:		cent of Level 2 and 3 Trauma facilities that:	
24		 had a specific approach to a trauma patient refer trauma immediately 	1. 2.	0% 5 7 87% 5 7	April
25		3. provide first aid and then refer trauma patients	3.	13%	
26		4. are poorly equipped to handle broken bones	4.	70%	2023.
27		 had suture and wound care supplies had gloves 	5. 6.	87% 6 90%	
28		7. had oxygen	7.	90% 23%	Š
29		8. had splinting/casting supplies	8.	10% 6	임
30		9. had blood for transfusion10. refer patients with a possible heart attack	9. 10.	0% X 0 100% and 60% A A A A A A A A A A A A A A A A A A A	Downloaded
31		11. refer patients with a possible heart attack immediately	11.		8
32		12. treat symptoms and then refer patients with a possible	12.	27%	from
33		heart attack 13. check vitals and then refer patients with a possible hear		13% ធិរិ 3% ភម្	έΞ.
34 25		attack		93%	http://bmjopen.bmj.com/
35 36		14. had sublingual nitroglycerine	16.	20%	Ĩ
		 are ill prepared to handle possible diabetic ketoacidosis (DKA) and must refer all cases 		17% g * 50% >	Ĕ
37 38		16. had a glucometer		37%	Ŗ
30 39		17. had insulin		13% ai	ēn
40		 refer cases of potential sepsis immediately provide treatment for cases of potential sepsis without 		80% 30%	.b
40		referral		13%	Ę.
42		20. did not know an approach to sepsis		50% 2 training, 37% 13% 13% 30% 30% 13% rcent of Level 4 and 5 facilities that: 97% 93% 83% 57% 50% 20% 20% 13% 33% 93% 93%	ğ
43		 had antibiotics had an organised approach to trauma 		97% <u>s</u> . 93% a	
44		23. are notified in advance of patients arriving to the hospital		83%	ل no
45		Percent of Level 4 and 5 facilities that:		57%	June
46		 had gloves had suture and wound care materials 		50% 6 20% 1	e 1
47		26. had oxygen		20%	11,
48		27. did not have access to a trained provider who can		13%	202
49		administer general or Regional anaesthesia			с С
50		 28. had morphine 29. had a functioning ECG machine 		93%	2025 at Agence Bibliographique de l
50		30. had nitroglycerine	35.	97%	ge
52		31. had a defibrillator		0% 70%	nç
53		 are well prepared to manage DKA had a glucometer 		20%	е В
54		34. had insulin	39.	13%	jqi
55		35. provided some treatment for sepsis		cent of Level 5 facilities that had:	ю
56		 had standardised clinical care guidelines do not have a standardised approach to trauma 		100% 80%	rap
57					bhi
58					ant
59					ğ
60		For peer review only - http://bmjopen.bmj.com/	site/abc	put/guidelines.xhtml	e L

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	 had nitroglycerine and a functioning ECG machine had a defibrillator 	42. 100% 43. 100%
	Number of Level 5 facilities that:	44. 60%
	40. had chest tubes and X-ray capability	45. 40%
	 had splinting and casting supplies had blood available for transfusion 	46. 20% 47. 100%
	43. gave oxygen to patients with suspected AMI	48. 100%
	44. gave aspirin to patients with suspected AMI	Percent of Level 4 facilities that had:
	gave morphine to patients with suspected AMI	49. 12%
	46. gave epinephrine to patients with suspected AMI	50. 48%
	47. had vasopressor agents48. had antibiotics	51. 64% 52. 80%
	Number of Level 4 facilities that:	53. 44%
	49. had chest tubes	54. 30%
	50. had X-ray capability	55. 44%
	 51. had blood available for transfusion 52. refer someone presenting with a possible acute 	56. 92%
	myocardial infarction immediately	
	53. stabilize and then refer someone presenting with a	
	possible acute myocardial infarction	
	54. provides diagnostic and treatment services without referral to someone presenting with a possible AMI	
	55. had vasopressor agents	
	56. had antibiotics	
hungo (2010)	Demont of reapondants that reported	Dereent of reasonable to that reasonable
hunga (2019)	Percent of respondents that reported 1. Access to a pre- hospital service in HIC	Percent of respondents that reported 1. 4%
	 Access to a pre- hospital service in LMIC 	2. 21%
	Access to a national emergency number in HIC	3. 4%
	 Access to a national emergency number in LMIC 	4. 21%
oyle (2015)	Percent of hospitals with 1. adult triage training	Percent of hospitals with 1. 43%
	2. pediatric triage training	2. 57%
	 formal training in adult critical care 	3. 86%
	4. in-house acute care courses for continuing education	4. 14%
	 a dedicated EC nurse out-of-hours clinician cover 	5. 71% 6. 71%
	7. intravenous (IV) gentamicin	7. 100%
	8. IV penicillin and quinine	8. 86%
	9. Oral rehydration solution and IV fluids	9. 100%
	 insulin equipment required to carry out IV procedures 	10. 29% 11. 100%
	12. oxygen concentrators or cylinders available in the EC	12. 43%
	13. with light unsuitable for clinical examination	13. 57%
	14. a system in place to identify ward patients whose clinical	14. 29%
	condition was deteriorating 15. guidelines for paediatric critical care	15. 71%
	16. guidelines for adult critical care	16. 57% 17. 57%
	17. Emergency care guidelines for children	18. 43%
	18. Emergency care guidelines for adults	19. 43%
	19. Paediatric triage guidelines	20. 29%
	20. adult triage guidelines 21. guidelines for oxygen therapy	21. 29% 22. 100%
	22. facilities to check haemoglobin and blood glucose	23. 71%
	23. ability to measure renal function	24. 57%
	24. radiography	25. 29%
	25. had a system in place for delaying regis- tration and payment until after the receipt of emergency treatment	26. 43% Percent of public facilities with
	for critically unwell adults	27. 0
	26. had a system in place for delaying registration and	28. 2
	payment until after the receipt of emergency treatment	Percent of private facilities with
	for critically unwell children	29. 100% 30. 100%
	Percent of public facilities with 27. adult triage training	30. 100% 31. 100%
	28. pediatric triage training	For public facilities, average number of
	Percent of private facilities with	32. 1
	29. resuscitation facilities for adults	33. 16/21
	 all of the six infrastructure indicators all 23 indicator drugs and all 34 equipment indicators 	34. 21/34 Percent of district hospital with

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	32. infrastructure indicators33. drug indicators34. equipment indicators	36. 0
	Percent of district hospital with	
	35. access to x-ray facilities36. emergency blood transfusion	
		· · · · · · · · · · · · · · · · · · ·
Wulf (2017)	 Financial barriers Health system issues 	 The inability to pay for transportation or medications, laboratory investigations, and radiography
Vulf (2015)	Percent of hospitals with	2. Limited bed capacity Protected Percent of hospitals with 1. 67% 2. 67% 67% 3. 0% 9. 4. 67% 67% 5. 100% 9. 7. 67% 67% 8. 0% 9. 9. 33% 9. Percent of clinics with 10. 20% 11. 0% 11. 12. 0% 11. 0% 13. 20% 14. 60% 15. 15. 0% 16. 60% 9.
	 emergency care area beds Supervisory level physicians consistently available during 	1. 67% 2. 67%
	2. Supervisory level physicians consistently available during the entire 24 hours	3. 0%
	3. with potable water	4. 67% c
	4. a list of emergency equipment	5. 100% 9
	 emergency equipment was available intermittently no formal training of staff for the use of this equipment 	6. 100% 7. 67%
	 regional training of star for the use of this equipment surgical services and dental care 	8. 0%
	8. critical care or ophthalmological services	9. 33%
	9. a protocol for the transfer of patients requiring a higher	Percent of clinics with
	level of care Percent of clinics with	10. 20% EQ
	10. electricity	12. 0%
	11. a list of emergency equipment	13. 20% ਰੱ
	12. basic equipment to manage obstetrical emergencies or	14. 60%
	imminent deliveries 13. pulse oximetry and glucometers	15. 0% %
	14. stethoscopes	17. 80%
	15. HIV care	Percent of health facilities with
	16. cholera and tuberculosis care	
	17. a protocol for the transfer of patients requiring a higher level of care	19. 100% 20. 13%
	Percent of health facilities with	21. 13% ថ្
	18. respiratory isolation area	22. 0%
	19. maintenance of records for patients seen in the acute	22 Heapitale had increased access to aquinment materia
	care setting 20. existence of an additional staffing resource list to be used	 14. 60% 15. 0% 16. 60% 17. 80% Percent of health facilities with 18. 0% 19. 100% 20. 13% 21. 13% 22. 0% 23. Hospitals had increased access to equipment, materia and medications compared to community clinics. No computed tomography existed in the region. 24. Some of the health centers required multiple modes of transportation, not being passable consistently by 4-wheeled vehicles.
	in event of disaster or emergency situations	computed tomography existed in the region.
	21. access to an ambulance for interfacility transport	24. Some of the health centers required multiple modes of
	22. use of a protocol or phones for the transfer of patient	wheeled vehicles.
	23. Resource issues	25. Patients were referred to the closest hospital, regardless
	24. Geographic barriers	whether that facility had the capability to handle the ca
	25. Referral issues	 Patients were referred to the closest hospital, regardless whether that facility had the capability to handle the cases. Males were almost twice as likely as females Affordability of the formal health service Distance No standardized training for EMS providers, dispatches
ayeb (2015)	1. Demographics likely to use formal services	1. Males were almost twice as likely as females
	2. Financial barriers	2. Affordability of the formal health service
	3. Geographic barriers	3. Distance
ashir (2014)	1. Training issues	1. No standardized training for EMS providers, dispatche
	2. Average emergency response time	
	 Geographic barriers Pre-hospital issues 	 45 minutes Few citizens reside where services exist
	5. Financial barriers	 Single emergency response number is not well publicit
		5. ambulances are paid either by cash on a fee for service
		basis or via an insurance option
erick (2013)	 Percent of individuals who perceived their condition as severe and sought health care in the formal system 	basis or via an insurance optiono1.57.4%2.36.2%
	2. Percent of individuals who perceived their condition as	 30.2% Geographic location less than 30 minutes from a health
	non-severe and sought health care in the formal system	facility, household head having a secondary school
	3. Demographics associated with increased seeking of	education, patient age under 15, and having health
	formal health care 4. Percent of individuals who received medicines free of	insurance26.1% in Guatemala, 29.1% in Honduras, and 34.2% in
	charge	Nicaragua
	5. Financial barriers	 26.1% in Guatemala, 29.1% in Honduras, and 34.2% in Nicaragua "Do not have money" was the most frequent reason for r seeking care in Nicaragua and Honduras e/about/guidelines.xhtml

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2 3 <u>22</u> 4 5	Hashtarkhani (2020)	1. Calculated accessibility by 2SFCA method	 Peripheral areas in Mashhad city have low access to EMS. Actual accessibility in the city center is low compared with potential accessibility.
5 6 ₂₃ 7 8 9	Hodkinson (2020)	 Barriers to seeking care Percent of people reporting wait times at facilities as a barrier to seeking care Percent of people reporting financial barriers 	 Concerns over personal safety 23.1% 5.1% EMS delays
1204 11 12 13 14	Hsia (2012)	 Pre-hospital issues Percent of hospitals I. not equipped with basic building resources I. had equipment and staff who could competently utilize the equipment at their facility I. had adequate monitoring of medication inventory I. with adequate infection control materials With adequate provide 24 hour emergence are provided. 	Percent of hospitals 1. 78% in Tanzania 2. 41% in Tanzania to 61% in Kenya 3. 14% in health centres and 18% in hospitals in Tanzanta 4. 0% in Tanzania 5. Fewer than half 6. less than 65% Percent of clinics 7. 7% to 35% of facilities. Fee associated with 1. KHR25 000 (\$6.25) 2. KHR45 000 (\$11.3) 3. KHR30 000 (\$7.5) 4. KHR137 697 (\$34.4) 5. General population did not have the contact number of the
15 16 17 18 19	Jacobs (2016)	 with capacity to provide 24-hour emergency care with basic infrastructure components such as water and electricity Percent of clinics with basic infrastructure Fee associated with 	6. less than 65% Percent of clinics 7. 7% to 35% of facilities.
20 21 22	646625 (2010)	 hospital ambulance Ambulance referrals to the provincial hospital transport by tuk-tuk overall fee associated with transport 	1. KHR25 000 (\$6.25) 2. KHR45 000 (\$11.3) 3. KHR30 000 (\$7.5) 4. KHR137 697 (\$34.4)
23 24 25 26 27 28 29		 Pre-hospital system issues Percent of people transported to health facility using their own means of transport Percent of individuals who report the health system was too far Training issues Percent of health centre staff members who were insufficiently qualified to successfully deal with the condition 	ambulance services. 6. 32% 7. 9% 8. Few health district staff received training in emergency are medicine 9. 59%
3206 31 32 33 34 35	Khan (2003)	 Training issues Equipment issues Health system issues Pre-hospital issues 	 Neither the ambulance driver nor the nurse has any former training or certification in advanced life support. Ambulances lack advanced cardiac life support equipment There is no physical location for advanced pediatric care or pediatric resuscitation. An organized emergency medical response system dom not exist, no emergency number
3257 37 38 39	Khan (2010)	 Mean time from occurrence of injury to arrival in the ER Range of time from occurrence of injury to arrival in the ER Patients who arrived in the ER after 1 hour of injury 	1. 4.7 h
423 41 42 43 44 45 46	Kirsch (1995)	 Patients who reached the ER within 1 hour of injury Percent of physicians who had taken an Advanced Trauma Life Support course had taken an Advanced Cardiac Life Support course or Advanced Pediatric Life Support training Percent of physicians how believed they could adequately perform intubation tube thoracostomy venous cutdown tracheastamy 	 2. Range 0.8–48 h 3. 675 (69%) 4. 303 (30.9%) Percent of physicians who 1. 30% 2. 0% Percent of physicians who believed they could perform 3. 18% 4. 15% 5. 15% 6. 5% 7. Nursing shortages reported in emergency department of Trained staff were not available during many nights or one of the staff were not available
47 48 49 50 51 52 53 54		 tracheostomy Staffing issues Resource issues Health system issues Communication issues. 	 Nursing shortages reported in emergency departments Trained staff were not available during many nights or weekends. IV line supplies, backboards, or cervical cours are not carried in ambulances. Specialized blood tests are not easily obtained. Limited supplies of banked blood. Limited availability of CT, ultrasound, and MRI. Lengthy delays in response from consulting specialities. Legal restrictions prevent ambulance drivers from starting I lines or giving medication.
5259 56 57 58	Kumar (2009)	1. Pre-hospital system issues	 The EDs do not have radios. Trained personnel as first responders were unavailable and pre-hospital care was lacking
59 60		For peer review only - http://bmjopen.bmj.com/site	e/about/guidelines.xhtml

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1		B
2 330 Levine (200	 Percent of patients that have access to motorized 	1. 20% Per
4 5 6 7 8 9 10 11 12 13	 Foreine in patients that have access to inicial additional transport Percent of providers that reported that their patients had to travel more than 10 km for surgical or obstetric services had access to blood smears for malaria lacked access to any laboratory diagnostic equipment could offer blood transfusions felt comfortable diagnosing the 7 emergency conditions assessed felt comfortable diagnosing obstructed labor felt comfortable treating the 7 emergency conditions assessed 	 20% 62.5% Less than half 44% 0% 63% 56% 75% 19% 0% 64% 1. 75% of shequs having a value lower than 0.4 for single performant 0.8 for the total trip. 2. Over 50% and again a patient can be transported from bis/delayed by comparison of the total trip.
14 15 Luo (2020) 16 17 18 19 20 21	 felt comfortable treating obstructed labor felt comfortable treating gastroenteritis Standardized E-2SFCA access scores Percent of shequs can be reached by an ambulance from the nearest EMS stations within 10 min 	her shequ to the nearest hospital within 9 min. During peak periods, for over 75% of shequs, it takes beso than 14 min to get an ambulance and less than 13 mine get to the nearest hospital, and the total jour- ney takes beso
232 23 24 25 26 27 28 29 30 31 32 33 34	 guarantee of payment before providing treatment to road traffic injury patients Cost of deposit before treatment Percent of health facilities that rated themselves as being well prepared to handle road traffic crash emergencies Percent of respondents that owed the hospitals more than of US \$ 133. were in a position to pay the bills would approach relatives and friends for financial assistance were transported to hospital by unknown persons were transported to hospital by persons who were previously known to them received any form of first aid at the crash site 	than 25 min 1. 14.6% 2. US \$6.7-667 3. 40.8% Percent of respondents that 4. 22.3% 5. 19.7% 6. 58.7% 7. 19.7% 8. 76.5% 9. 16.0% 10. 74.0% Percent of cases in which the ambulance response time way
353 Mahmood (* 36 37 38 39 40 41 42 43	 motorists or the less injured casualties Percent of cases in which the ambulance response time was 1. less than 10 minutes 2. 15-20 minutes 3. 30-45 minutes Percent of cases in which the time from the site to the hospital was 4. 5 minutes 5. 10-15 minutes 6. 20-30 minutes 	1. 60%
444 Mathew (20) 45 46 47 48 49 50 51 52 53 54	 had more than 80% of the population residing within half- an-hour travel distance of a PCI-capable hospital had more than 90% population having timely (within 1h) access to some mode of reperfusion therapy for STEMI, either thrombolysis and/or primary PCI Percent of the population residing within half-an-hour travel distance from a PCI- capable hospital had access to a thrombolysis-capable hospital within 1h travel time would have had to travel more than an hour to access a 	2. 30% At training, and similar technologies. 3. 10% Percent of cases in which the time from the site to the hosphing, and similar technologies. 4. 32% 5. 48% 6. 20% Percent of districts that 1. 36% 2. 57% Percent of the population 3. 69.84% 4. 21.87% 5. 8.28% Percent of respondents reporting 1. 8%
54 535 Mock (1997 56 57 58 59 60	reperfusion-capable hospital) Percent of respondents reporting 1. distance to treatment is too far For peer review only - http://bmjopen.bmj.com/site	Percent of respondents reporting 1. 8% Percent of respondents reporting biggraphique de e/about/guidelines.xhtml

1			
2 3		2. preferences for other treatments	2. 37%
4 5		3. Types of injuries more likely to receive formal medical	3. Head or torso injuries, transportation related injuries
6 7		 care Use of formal medical services for persons aged less than 20 years 	assaults 4. 54% 5. 61%
8		 Use of formal medical services for persons aged more than 20 years 	3. 0170
9 ₃₆ 10	Mock (2001)	Percent of survey respondents reporting barriers to care: 1. preference for other treatments	Percent of survey respondents reporting barriers to care: 1. 20%
11		2. financial	2. 53%
12		 health care utilization when health care was available in the user's town 	3. 59% 4. 41%
13		 health care utilization when health care was not available 	4. 41%
14		in the user's town	
1 ³⁷	Mock (2006)	1. Training issues	 Lack of training for trauma care, including in-service for dectors, lack of training to use againment.
16		 Staffing issues Resources issues 	for doctors, lack of training to use equipment 2. Lack of surgical coverage.
17		4. Health system issues	3. Resources for acute resuscitation were limited. Diffic
18			the procurement process exist. Lack of laboratory te
19			imaging, oxygen, fluids, chest tube equipment, pulse oximetry, ventilators, prostheses for amputees, med
20			 Lack of trauma registry or quality improvement program
2 ³¹⁸	Mohan (2018)	1. Demographics associated with significant pre-hospital	1. Elderly, rural, and illiterate populations
22		delay 2. Barriers to seeking care	 Recognizing symptoms as cardiac in origin 96.4%
23		 Barners to seeking care Percent of hospitals with ECG availability 	4. 83%
24		4. Percent of outpatient facilities with ECG availability	Percent of patients
25		Percent of patients	5. 54.8%
26		 to whom a hospital was the nearest medical aid to whom a clinic was the nearest medical aid 	6. 45.2% 7. 42%
27		7. presented with more than 6 hours of prehospital delay	1. 1270
289	Mould-Millman	Development of:	Development of:
29	(2015) Assessment of	 Tiers of Providers Recruitment and Retention of providers 	 Minimally developed Mostly developed
30	Emergency	3. Continuing Education	3. Minimally developed
31	Medical Services	4. Initial Education	4. Partially developed
32	in the Ashanti	5. Team Training	5. Partially developed
33	Region of Ghana. Barriers to	 Equipment and Medication Toll-free Number 	 Mostly developed Moderately developed
34	Damers to	8. Call processing and dispatch	8. Partially developed
35		9. Primary Transportation and Inter-facility Transfers	9. Mostly developed
36		10. Communication 11. Community Integration	 Partially developed Minimally developed
37		12. Healthcare System Integration	12. Partially developed
38		13. EMS Legislature, Rules and Regulation	13. Mostly developed
39		14. Sustainable Resources	14. Mostly developed
40		 Public Knowledge Quality Assurance and 	 Minimally developed Minimally developed
		Improvement	re. Wininitary developed
41 40 42	Mould-Millman	Percent of survey respondents that:	Percent of survey respondents that believed that:
43	(2015) Accessing	 believe EMTs offer high-quality care believe it is "better" to go by ambulance 	1. 54.7% 2. 86.1%
43	Emergency	 believe taxis are faster than ambulances in Accra 	3. 78.0%
44	Medical Services	4. believe government ambulances were free or affordable	4. 53.2%
45 46	in Accra, Ghana:	5. believe private ambulances	5. 50.2%
-	Development of a Survey	were too expensive6. knew the existence of a public access medical	6. 43.8% 7. 37.1%
47	Instrument and	emergency telephone number	8. 35.7%
48	Initial Application	7. knew that the emergency number was a toll-free call	9. 45.5%
49	in Ghana.	8. would be more likely to call	10. 35.3%
50		the emergency number if they knew the call was toll free9. knew about the government ambulance service	11. 6.8%
51		10. indicated it would take a government ambulance 15	
52		minutes or less to arrive at the location	
53 -41	Mould-Millman	 indicated it would take 60 minutes or more Percent of systems that utilized: 	Percent of systems that utilized:
5 ⁴ 4 ¹	(2017)	 tier-one (layperson responders trained in first aid) 	1. 48%
55	. ,	2. tier-two (professional or medically-trained)	2. 96.0%
56		3. Basic emergency medical technicians (EMTs)	3. 84%
57			
58			
59			

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1			4. 60% 5. 84% 6. 28% 7. 4% 8. 40% 9. 44% 10. 12% 11. 84% 12. 68% 13. 72% 14. 56% 15. 12% 16. 32% 17. 32% 18. 12% 19. 25 20. 29.6% 21. 12.5% 22. 9.3% 23. 51.8% 24. 100% 25. 26% 26. Median direct distances between injury sites and the traum centers were 1. 5.65 (3.19 - 8.64) km 2. 5.31 (2.89 - 8.54) km 3. 5.11 (3.11 - 8.72) km 6.
ו ר			
2			
3		 advanced providers more often basic providers more often 	4. 60% ? 5. 84% *
4		 basic providers more often prehospital nurses 	6. 28%
5		7. used only advanced providers	7. 4%
6		8. EMS physicians	8. 40% Š
7		9. quality assurance programs	9. 44%
8		10. research	10. 12% 5 11. 84% 6
9		 Basic Life Support - capable vehicles Advanced Life Support -capable vehicles 	د معرف معرف معرف معرف معرف معرف معرف معرف
10		13. vehicles posted at ambulance stations	13. 72% D
11		14. vehicles posted at health care facilities	14. 56% o
12		15. motorcycle ambulances	15. 12% 6. 11
13		 fixed wing air transport rotary wing (helicopter) ambulances 	16. 32% fe 6
14		18. water-craft	
15			19. 25 c o
		19. Total number of EMS systems identified	op op
16		Percent of countries in which	20. 29.6% YI. 2
17		 EMS systems existed in Africa EMS systems existed in West Africa 	21. 12.5% g 02 22. 9.3% g 1 .
18		22. no EMS systems existed	23. 51.8% , +
19		23. the questionnaire was not returned	24. 100% C
20		24. some form of regulations governing EMS or ambulance	25. 26%
21		operations existed	ling 4 o
22		25. an established toll-free emergency telephone number existed	g fi d
2432	Nagata (2011)	Median direct distances between injury sites and the trauma	12. 68% 13. 72% 14. 56% 15. 12% 16. 32% 17. 32% 18. 12% 19. 25 20. 29.6% 21. 12.5% 22. 9.3% 23. 51.8% 24. 100% 25. 26% Median direct distances between injury sites and the traumation of the traumation
24	- 3 ,	centers were	centers were
25		1. Viet Duc Hospital	1. 5.65 (3.19 - 8.64) km
26		2. Bach Mai Hospital	2. 5.31 (2.89 - 8.54) km
20		3. Saint Paul Hospital	
27 283	Nielsen (2012)	1. Access to emergency care services within 1 hour	1. 100 percent in Urban Brazil, Colombia, and Maharash and State to very low in Kenya, Pakistan, Sri Lanka, and
		2. To whom advanced life support capabilities during	State to very low in Kenya, Pakistan, Sri Lanka, and
29		transport was available	
30		 To whom basic life support capabilities during transport was available 	2. A significant number of persons in two of the upper middle a
31		4. Training issues	 Vietnam A significant number of persons in two of the upper micros o
32			State, India.
33			State, India. 4. Varying levels of training of providers, including no
34			emergency medicine training
3,54	Ntabaye (1998)	1. Resource issues	 100 percent in Urban Brazil, Colombia, and Maharash the provider of the upper microscopy of the upper microscopy
36	Nabaye (1990)	 Percent of respondents who did not have the ability to 	2. 45%
37		pay for health services	3. Fare for transportation ≥ 3.
38		3. Financial barriers	4. Those who had a higher number of missing teeth, wer
39		 Demographics more likely to seek care Percent of respondents who indicated fear of dental 	5. 6.5%
40		treatment	5. 0.5 % ng br
4 ⁵	Ouma (2018)	1. Percent of people living within 2-hour travel time of the	1. 71%
		nearest public hospital	2. 71·8%
42		2. Percent of women of child bearing age living within 2-	3. 29% Si C
43		hour travel time of the nearest public hospitalPercent of people living more than 2-hour travel time of	4. 28·2% <u>B</u> 9 5. Less than 25% in South Sudan to more than 90% in Naceria.
44		the nearest public hospital	
45		4. Percent of women of child bearing age living more than	Comoros, São Tomé and Príncipe, and Zanzibar.
46		2-hour travel time of the nearest public hospital	6. South Sudan, Mauritania, Eritrea, Niger, Sudan, 🛉 🕇
47		5. Percent of the population within 2-hour travel time of a	 South Sudan, Mauritania, Eritrea, Niger, Sudan, Madagascar, and Chad. Nigeria, Kenya, and South Africa 16
48		public hospital6. Countries with less than 50% of the population within 2-	7. Nigeria, Kenya, and South Africa
49		hour travel time of a public emergency care hospital	וסיקד טון איז
50		7. Countries with more than 90% of their respective	
51		population living within 2-hour travel time of a hospital	Agence
52		8. Number of countries with more than 80% of the	nç
52 5486	Pigoga (2020)	population within 2-hour travel time of a hospital 1. Training issues	
5 5 54		2. Health system issues	1. Training related to critical trauma and airway interventions, D and neonatal care; issues with treating malnutrition or severe anaemia; inability to perform the following
		3. Resource issues	severe anaemia; inability to perform the following
55		4. Quality issues	procedures: intraosseous access or venous cutdown, apply
56			hd
57			liq
58			
59			severe anaemia; inability to perform the following of procedures: intraosseous access or venous cutdown, apply ite/about/guidelines.xhtml
60		For peer review only - http://bmjopen.bmj.com/s	

1		b C C C C C C C C C C C C C C C C C C C
2		Dp
3 4 5		fasciotomies or escharotomies 2. Only one facility with a dedicated resuscitation area
6 7 8		 Lack of medications, equipment, and tests, including: pulse oximetry, airway management, needle thoracostomy, chest tube, pelvic binders, ECG, ultrasound, thrombolytics, blood transfusion, defibrillation, cardioversion, pericardiocentesis, external cardiac pacing, procedural sedation, IV antibiotics, pericardiocentesis
9 10		IV vasopressors, uterotonic drugs
11 12		 Mean distance and time travelled by direct group Mean distance and time travelled by referred group Mean distance and time travelled by referred group Percent of referred cases that clocked unnecessary distance to reach care Percent of direct cases that clocked unnecessary distance to reach care Median unnecessary distance clocked by referred cases to reach care Median unnecessary distance clocked by direct cases to reach care Training issues Training issues No ambulance driver had formal training in first aid or use to the total processing total processing to the total processing total processing to the total processing total procesi
1437	Radjou (2013)	1. Mean distance and time travelled by direct group 1. 31.4 km, 90 min 🗳 🔮
14		2.Mean distance and time travelled by referred group2.52.81 km, 279 min3.Percent of referred cases that clocked unnecessary3.54%
15		distance to reach care 4. 14.2%
16		4. Percent of direct cases that clocked unnecessary 5. 24.49 km
17		distance to reach care 6. 10.86 km G
18		to reach care
19		6. Median unnecessary distance clocked by direct cases to
20		reach care
21		
22		
23	Razzak (2001)	1. Training issues 1. No ambulance driver had formal training in first aid or c
24	Nazzak (2001)	 Training issues Percent of ambulance services that carry only a stretcher Cost of transport for non-air-conditioned ambulances No ambulance driver had formal training in first aid or prehospital care 71%
25		3. Cost of transport for non-air-conditioned ambulances 2. 71%
26		4. Cost of transport for air-conditioned ambulances 3. Pakistani rupee (PR) 7–10 (\$0.12–0.17) per mile
27		5. Percent of ambulance services that operate only during 4. PR 15–20 (\$0.26–0.35) per mile
28		 Training issues Percent of ambulance services that carry only a stretcher Cost of transport for non-air-conditioned ambulances Cost of transport for air-conditioned ambulances Percent of ambulance services that operate only during day hours Percent of patients that said the streets in their area were too narrow for an ambulance they preferred using taxis or cars due to high cost they preferred using taxis or cars due to easy access they patient was not sick enough to call an ambulance they used a taxi because the patient was too sick to wait for anything else patient was sick enough to come to the ED patient was sick enough to come to the ED patient was sick enough to come to the ED they did not come to the ED they did no
29		6. the streets in their area were too narrow for an 6. 3%
30		ambulance 7. 8%
31		7.they did not use ambulances due to high cost8.38%8.they preferred using taxis or cars due to easy access9.26%
		9. the patient was not sick enough to call an ambulance 10. 20%
32		10. they used a taxi because the patient was too sick to wait 11. 45%
33		for anything else
34		11. patient was sick enough to come to the ED13. 11%14. 44%12. they did not come to the ED because of the slow response of the ambulance service14. 44%15. 22%13. they did not come to the ED because they did not know16. 21%16. 21%
35		response of the ambulance service
36		13. they did not come to the ED because they did not know 16. 21%
37		how to find one 17. 57%
38		14. they would call an ambulance only if they are unable to 18. 21% walk 19. 14%
39		15. they would call an ambulance only if they were very sick 20. 0%
40		or near death
41		16. they were not sure when to call an ambulance
42		17. they knew of at least one ambulance service 18. they knew of two ambulance services
43		how to find one17. 57%14. they would call an ambulance only if they are unable to walk18. 21%15. they would call an ambulance only if they were very sick or near death19. 14%16. they were not sure when to call an ambulance20. 0%17. they knew of at least one ambulance service20. 0%18. they knew of at least one ambulance service20. 0%19. they did not know of any ambulance service20. knew the phone number of any ambulance service20. knew the phone number of any ambulance service20. knew the phone number of any ambulance service21. financial1. 37.2%2. use of complementary medicine2. 22.2%3. the that condition was not severe enough to visit hospital3. 8.7%4. limited accessibility to hospital4. 5.7%
44		20. knew the phone number of any ambulance service
459	Ro (2017)	Percent of respondents that reported the primary reasons for Percent of respondents that reported the primary reasons for not seeking health acro ware
46		not seeking health care were: seeking health care were: 5 4 1. 37.2%
47		2. use of complementary medicine 2. 22.2%
48		2.use of complementary medicine2.22.2%Do3.the that condition was not severe enough to visit hospital3.8.7%do4.limited accessibility to hospital4.5.7%do5.social and family disapproval5.4.6%s.
49		4. limited accessibility to hospital 4. 5.7% r
50		J. Social and family disapproval $J. 4.0\%$
51		 6. Those who were more likely to experience unmet needs in the previous year 6. People whose mean income was below moderate levels, those who lived far from a teaching hospital or close to a district hospital
52		district hospital
5 <u>5</u> 30	$D_{ab} = (0.17)$	
-50 54	Rocha (2017) Addressing	 States with high levels of accessibility Number of municipalities that had high accessibility to small hospitals and low to high complexity center Paraná, Goiás, Minas Gerais, Bahia, Piauí, Rio Grande do Norte, Ceará e Pernambuco 1595 74% 824 For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml
54 55	geographic	small hospitals and low to high complexity center 2. 1595
56	access barriers	3. 74%
	to emergency	4. 824 P .
57		ġ. c
58		
59		For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml
60		i or peer review only interprivation periodification and and an antimitian

care services: a National ecologic study of hospitals	 Percentage of municipalities with below average access to high complexity center that were covered by small hospitals 	
in Brazil.	4. Number of municipalities that did not meet the criteria of	
Rocha (2017)	maximum travel time of 2 hours 1. Percentage of small hospitals that were in municipalities	1. 26% of small hospitals
Access to	that had also high complexity centers	2. 63%
emergency care services: a	2. Percentage of municipalities were located within less than 60 km from the closest city with a high complexity	3. 14 million 4. 12%
transversal	center with an adult ICU	
ecological study	3. Number of people that were at least 120 km away from a	
about Brazilian emergency	high complexity center with an adult ICU4. Percent of the population who were more than 120 km	
health care	away from a health facility with a neonatal ICU	
network. Roy (2010)	1. Training issues	1. Lack of training of ambulance attendants
R0y (2010)	2. Equipment issues	2. No resuscitation equipment in the ambulance
	Odds ratio of likelihood the following groups would receive	Odds ratio of likelihood the following groups would receive
	prehospital care: 3. road traffic accident victims	prehospital care: 3. 2.3
	4. arriving by government ambulance	4. 10.83
	5. arriving by taxi	5. 0.54
	 being transferred from other medical facilities for "medico-legal reasons" 	 Lack of training of ambulance attendants No resuscitation equipment in the ambulance Odds ratio of likelihood the following groups would receive prehospital care: 2.3 10.83 0.54 0.1 Lack of laboratory testing Conduct of health professional does not meet the expectations of the patients
Scolari (2018)	1. Resource issues	1. Lack of laboratory testing
	 Acceptability issues Health systems issues 	 Conduct of health professional does not meet the expectations of the patients
	4. Geographic barriers	3. Hours of operation and bed limitations
		 Lack of laboratory testing Conduct of health professional does not meet the expectations of the patients Hours of operation and bed limitations Geographic relationship to care 56.75km±123km. 63 %
Siddiqui (2008)	1. Mean distance from the residence to the hospital	 Scographic relationship to care 56.75km±123km. 63 % 86.5% 60.6% 12.7%
	Percent of patients who	2. 63 %
	2. came late who were referred	3. 86.5% 4. 60.6%
	 presented within 60 minutes of onset of symptoms were first taken to another hospital mainly cardiac 	4. 60.6% 5. 12.7%
	hospital and then referred here	6. 28%
	5. first opted for alternative medicines	7. 32%
	 thought stroke symptoms would resolve spontaneously did not know a single symptom of stroke 	8. 10.9% 9. 67%
	8. knew at least one stroke symptom	10. 61%
	 9. hemiplegia was the most familiar stroke symptom 10. speech disturbance was the most familiar stroke 	11. 30 minutes
	symptom	6. 28% 7. 32% 8. 10.9% 9. 67% 10. 61% 11. 30 minutes
	11. Median time from onset of symptoms and contact with	
	general practitioner	
Sodemann	1. Odds ratio associated with mortality risk within 30 days of	1. 0.55
(2006)	first consultation for those acquainted with a medical	2. Mothers belonging to Muslim ethnic groups
	doctor 2. Those whom were less likely to present a severely ill	
	child	 0.55 Mothers belonging to Muslim ethnic groups Lack of a single toll-free emergency number, knowled the emergency number, available community first responders, 24-hour EMS availability, Acceptability of EMS to the community Amharic speaking, previous ambulance use 1.53 Long arrival time for ambulance, not enough distributia ambulance stations, and difficulty of accessing the pho-
Stein (2016)	1. Pre-hospital issues	1. Lack of a single toll-free emergency number, knowled
()	2. Acceptability issues	the emergency number, available community first
		responders, 24-hour EMS availability, 2. Acceptability of EMS to the community
Sultan (2019)	1. Factors associated with increased likelihood of	 Acceptability of EMS to the community Amharic speaking, previous ambulance use
× - /	ambulance use	2. 1.53
	 Odds ratio associated with the ambulance use and police as a patient companion 	 Long arrival time for ambulance, not enough distribution ambulance stations, and difficulty of accessing the photon
	3. Pre-hospital issues	
Suriyawongpaisal	1. Financial barriers	1. Preauthorization
(2018)	2. Demographics associated with financial barriers	2. Females were less likely to have preauthorization
Suriyawongpaisal (2016)	1. Financial barriers	1. Copayment
Tansley (2015)	1. Percent of the population within 50km of road travel	1. 28%
	distance to tertiary care	
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	2. Proportion of a region's population within a 50-km service area of a Level C facility	 0% in the more remote regions to 95.4% in the more region Haiti, 0% in the Nord Ouest department to the Ouest department
Tansley (2016)	1. Proportion of Ghana's landmass that is serviceable within	1. 8.7 to 59.4% 2. 37% to 79%
	60-minutes of an National Ambulance Service station (from 2004 to 2014)	 37% to 79% 26% to 61%
	2. Proportion of the population within a 60-minute	4. 0.05 in the Obuasi Municipal District to 2.4 in the
	catchment area of a N/AS station (from 2004 to 2014) 3. Population within a 30-minute catchment area of a N/AS	West District Percent of facilities in Namibia found to be capable of p
	station	level:
	 Ambulances per 100,000 Percent of facilities in Namibia found to be capable of 	5. 12.4% 6. 7.3%
	providing care level:	7. 1.2%
	5. A 6. B	 88% Percent of facilities in Haiti found to be capable of prov
	7. C	 Percent of facilities in Namibia found to be capable of plevel: 5. 12.4% 6. 7.3% 7. 1.2% 8. 88% Percent of facilities in Haiti found to be capable of provievel 9. 18.9% 10. 1.7% 11. 0.9% 12. 81.1%
	8. X (unsuitable for providing emergency care) Percent of facilities in Haiti found to be capable of providing	9. 18.9% 10. 1.7%
	care level:	11. 0.9%
	9. A 10. B	12. 81.1%
	11. C	
Thomson (2005)	12. X 1. Health system issue	1. Rural, district and small Urban hospitals have no
	2. Training issue	department
	 Staffing issue Resource issues 	 No emergency medicine training EDs are staffed by only one doctor
	5. Financial barriers	4. Lack of CT availability after hours
	6. Pre-hospital system issues	 Patients must pay cash for any imaging Ambulances have to travel up to 200 miles, lack c
		helicopters, private ambulance services have tried
		their control rooms to cellular networks, which has response to major accidents and incidents by the
		responsible authorities, lack of dispatchers
Treleaven (2017)	1. Demographics that demonstrated worse outcomes	 helicopters, private ambulance services have tried their control rooms to cellular networks, which has response to major accidents and incidents by the responsible authorities, lack of dispatchers Poorer, younger, rural, and children who were refe another facility children 53.1% 2.25 fatalities/km 2.91 fatalities/km
.,		4 50.49
Vanderschuren (2015)	 Percent of fatalities that were outside of the Golden Hour Fatality rate within the service areas 	1. 53.1% 2. 2.25 fatalities/km
	3. Fatality rate within the service gaps	3. 2.91 fatalities/km
Wen (2011)	1. Financial barriers	1. Payment is requested at the time of care
	2. Percent of individuals who were prevented from receiving	 Payment is requested at the time of care one-third Lack of prehospital care Hours of travel are required in remote areas Lack of resources, including electricity and equiprime
	treatment due to lack of payment 3. Pre-hospital system issues	 Lack of prehospital care Hours of travel are required in remote areas
	4. Geographic barriers	 Payment is requested at the time of care one-third Lack of prehospital care Hours of travel are required in remote areas Lack of resources, including electricity and equipr No emergency medicine training, one hospital provided training at the basic life support (BLS) no hospital provided courses such as Advanced (BLS)
	 Resource issues Training issues 	 No emergency medicine training, one hospital pro specialised training at the basic life support (BLS)
	C C	no nospital provided courses such as Advanced e
		Life Support (ACLS), Advanced Trauma Life Supp (ATLS), or Paediatric Advanced Life Support (PAI
		training.
Wesson (2015)	1. Training issues	 (ATLS), or Paediatric Advanced Trauma Life Support (PAI training. No formal or trauma-specific training, very few protrained in BLS or ACLS.
	 Resource issues Geographic barriers 	trained in BLS or ACLS. 2. Lack of basic trauma equipment.
	4. Pre-hospital issues	3. Distance to a facility
	 Transportation issues Staffing issues 	 trained in BLS or ACLS. Lack of basic trauma equipment. Distance to a facility A publically available ambulance system did not e of community awareness of emergency phone nu
	7. Financial issues	of function of emergency phone number
	 Respondents' opinion on how to improve pre-hospital care 	of function of emergency phone number5. Lack of transport to the health care facility.6. It is not safe for the medical officers to report to th at night
	 Factors affecting the decision to seek care 	at night
		 Inability to pay hospital fees and transport Provide first aid and triage trauma training to com
		members and the police9. Severity of the injury, traditional medicine and reli

- 2 367 Zaidi (2013) Median travel time to ER 1. 1. 2. Odds ratio associated with patients likely to seek 4 immediate health care at a non-medical facility or 2. 5 administer self- treatment compared to visiting a medical 6 facility 768 Percent of patients who waited the following times to Zimmerman evaluated by a physician in the ED (2020)8 1. 0.0 to 15.0 minutes 1. 9 15.1 to 30.0 2. 2. 10 more than 45.0 minutes 3. 3. 4. 30.1 to 45.0 minutes 4. 11 5. Percent of patients who waited the 0.0 to 1.0 hours to 5. 12 receive lab tests 6. 13 6. Percent of severe GCS patients who received lab tests 7. within 1.0 hours of physician evaluation 8 14 7. Percent of mild GCS patients who received lab tests 15 within 1.0 hours of physician evaluation 16 8 Percent of moderate GCS patients who received lab ους. 1.0 hours υ. . 17 tests within 1.0 hours of physician evaluation 18 19 20 21 22 23 24 25 26 27 28 29
 - From Hyderabad: (20 minutes), from Mansehra (120 minutes).
 - Peshawar: 144.45, Bahawalpur: 131.36, Abbottabad 5.12, Hyderabad - 6.87

Percent of patients who waited the following times to evaluated by a physician in the ED

69.2%

- 19.0% 7.8%
- 4.1%
- 48.4%
- 56.1%
- 52.0%
- 53.0%

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3	Appendix 1
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5	Search Strategy: PUBMED
6 7	Initial Search: Feb 4 2020; Follow up search date: 11/22/2020; Second Follow up search date:
8	11/30/2020
8 9	Emergency med terms
10	"emergency responder"[tw] OR "emergency responders"[tw] OR "emergency doctor"[tw] OR
11	"emergency doctors"[tw] OR "emergency clinician"[tw] OR "emergency clinicians"[tw] OR
12	"emergency physician"[tw] OR "emergency physicians"[tw] OR "emergency personnel"[tw]
13	OR "emergency medical personnel"[tw] OR "emergency service"[tw] OR "emergency
14	services"[tw] OR "emergency medical service"[tw] OR "emergency medical services"[tw] OR
15	"emergency medicine"[tw] OR "emergency health service"[tw] OR "emergency health
16	services"[tw] OR "emergency care"[tw] OR "emergency healthcare"[tw] OR "emergency
17	treatment"[tw] OR "emergency treatments"[tw] OR "emergency department"[tw] OR
18	"emergency departments"[tw] OR "emergency room"[tw] OR "emergency rooms"[tw] OR
19	"emergency ward"[tw] OR "emergency wards"[tw] OR "emergency unit"[tw] OR "emergency
20	units"[tw] OR "emergency hospital"[tw] OR "emergency hospitals"[tw] OR "emergency
21	clinic"[tw] OR "emergency clinics"[tw] OR "emergency setting"[tw] OR "emergency staff"[tw]
22	OR "emergency response"[tw] OR "emergency medical technician"[tw] OR "emergency
23	medical technicians"[tw] OR "paramedic"[tw] OR "paramedics"[tw] OR "ambulance"[tw] OR
24	"ambulances"[tw] OR "ER"[tw] OR "first responder"[tw] OR "first responders"[tw] OR "rescue
25	work"[tw] OR "rescue worker"[tw] OR "rescue workers"[tw] OR "relief work"[tw] OR "relief
26	worker"[tw] OR "relief workers"[tw] OR "firefighter"[tw] OR "firefighters"[tw] OR "fire fighter"[tw]
27	OR "fire fighters"[tw] OR "trauma center"[tw] OR "trauma centers"[tw] OR "trauma unit"[tw]
28 29	OR "trauma units"[tw] OR "critical care"[tw] OR "critical illness"[tw] OR "critical illnesses"[tw]
29 30	OR "resuscitation"[tw] OR "shock"[tw] OR "sepsis"[tw] OR "septicemia"[tw] OR
30	"septicaemia"[tw] OR "acute care"[tw] OR "acute disease"[tw] OR "acute diseases"[tw] OR
32	"prehospital"[tw] OR "pre hospital"[tw] OR "wound"[tw] OR "wounds"[tw] OR "triage"[tw] OR
33	"pregnancy complication"[tw] OR "pregnancy complications"[tw] OR "obstetric
34	complication"[tw] OR "obstetric complications"[tw] OR "obstetric emergency"[tw] OR "obstetric
35	emergencies"[tw]
36	("Access"[tw]) AND ("availability" OR "availabl*" OR "affordab*" OR "cost" OR "distance" OR
37	*spatial" OR *barrier OR *barriers" OR *quality") AND
38	
39	LMIC: based on Cochrane Foundation PubMed Filter
40	("developing country"[tw] OR "developing countries"[tw] OR "developing nation"[tw] OR
41	"developing nations"[tw] OR "developing population"[tw] OR "developing populations"[tw] OR
42	"developing world"[tw] OR "less developed country"[tw] OR "less developed countries"[tw] OR
43	"less developed nation"[tw] OR "less developed nations"[tw] OR "less developed population"[tw]
44	OR "less developed populations"[tw] OR "less developed world"[tw] OR "lesser developed
45	country"[tw] OR "lesser developed countries"[tw] OR "lesser developed nation"[tw] OR "lesser
46	developed nations"[tw] OR "lesser developed population"[tw] OR "lesser developed
47	populations"[tw] OR "lesser developed world"[tw] OR "least developed country"[tw] OR "least
48 49	developed countries"[tw] OR "least developed nation"[tw] OR "least developed nations"[tw] OR
49 50	"least developed population"[tw] OR "least developed populations"[tw] OR "least developed
50 51	world"[tw] OR "under developed country"[tw] OR "under developed countries"[tw] OR "under
52	developed nation"[tw] OR "under developed nations"[tw] OR "under developed population"[tw]
53	OR "under developed populations"[tw] OR "under developed world"[tw] OR "underdeveloped
54	country"[tw] OR "underdeveloped countries"[tw] OR "underdeveloped nation"[tw] OR
55	"underdeveloped nations"[tw] OR "underdeveloped population"[tw] OR "underdeveloped
56	populations"[tw] OR "underdeveloped world"[tw] OR "middle income country"[tw] OR "middle
57	
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OVID, Global Health (CABI): Used Identical terms as Embase

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Embase: Date of Search: Feb 6 2020 Access terms

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56 57 58 ('emergency responder' OR 'emergency responders' OR 'emergency doctor' OR 'emergency doctors' OR 'emergency clinician' OR 'emergency clinicians' OR 'emergency physician' OR 'emergency physicians' OR 'emergency personnel' OR 'emergency medical personnel' OR 'emergency service' OR 'emergency services' OR 'emergency medical service' OR 'emergency medical services' OR 'emergency medicine' OR 'emergency health service' OR 'emergency health services' OR 'emergency care' OR 'emergency healthcare' OR 'emergency treatment' OR 'emergency treatments' OR 'emergency department' OR 'emergency departments' OR 'emergency room' OR 'emergency rooms' OR 'emergency ward' OR 'emergency wards' OR 'emergency unit' OR 'emergency units' OR 'emergency hospital' OR 'emergency hospitals' OR 'emergency clinic' OR 'emergency clinics' OR 'emergency setting' OR 'emergency staff' OR 'emergency response' OR 'emergency medical technician' OR 'emergency medical technicians' OR 'paramedic' OR 'paramedics' OR 'ambulance' OR 'ambulances' OR 'ER' OR 'first responder' OR 'first responders' OR 'rescue work' OR 'rescue worker' OR 'rescue workers' OR 'relief work' OR 'relief worker' OR 'relief workers' OR 'firefighter' OR 'firefighters' OR 'fire fighter' OR 'fire fighters' OR 'trauma center' OR 'trauma centers' OR 'trauma unit' OR 'trauma units' OR 'critical care' OR 'critical illness' OR 'critical illnesses' OR 'resuscitation' OR 'shock' OR 'sepsis' OR 'septicemia' OR 'septicaemia' OR 'acute care' OR 'acute disease' OR 'acute diseases' OR 'prehospital' OR 'pre hospital' OR 'wound' OR 'wounds' OR 'triage' OR 'pregnancy complication' OR 'pregnancy complications' OR 'obstetric complication' OR 'obstetric complications' OR 'obstetric emergency' OR 'obstetric emergencies')

AND 'Access' AND ('availability' OR 'availabl*' OR 'affordab*' OR 'cost' OR 'distance' OR 'spatial' OR 'barrier' OR 'barriers' OR 'quality') AND ('emergency responder' OR 'emergency responders' OR 'emergency doctor' OR 'emergency doctors' OR 'emergency clinician' OR 'emergency clinicians' OR 'emergency physician' OR 'emergency physicians' OR 'emergency personnel' OR 'emergency medical personnel' OR 'emergency service' OR 'emergency services' OR 'emergency medical service' OR 'emergency medical services' OR 'emergency medicine' OR 'emergency health service' OR 'emergency health services' OR 'emergency care' OR 'emergency healthcare' OR 'emergency treatment' OR 'emergency treatments' OR 'emergency department' OR 'emergency departments' OR 'emergency room' OR 'emergency rooms' OR 'emergency ward' OR 'emergency wards' OR 'emergency unit' OR 'emergency units' OR 'emergency hospital' OR 'emergency hospitals' OR 'emergency clinic' OR 'emergency clinics' OR 'emergency setting' OR 'emergency staff' OR 'emergency response' OR 'emergency medical technician' OR 'emergency medical technicians' OR 'paramedic' OR 'paramedics' OR 'ambulance' OR 'ambulances' OR 'ER' OR 'first responder' OR 'first responders' OR 'rescue work' OR 'rescue worker' OR 'rescue workers' OR 'relief work' OR 'relief worker' OR 'relief workers' OR 'firefighter' OR 'firefighters' OR 'fire fighter' OR 'fire fighters' OR 'trauma center' OR 'trauma centers' OR 'trauma unit' OR 'trauma units' OR 'critical care' OR 'critical illness' OR 'critical illnesses' OR 'resuscitation' OR 'shock' OR 'sepsis' OR 'septicemia' OR 'septicaemia' OR 'acute care' OR 'acute disease' OR 'acute diseases' OR 'prehospital' OR 'pre hospital' OR 'wound' OR 'wounds' OR 'triage' OR 'pregnancy complication' OR 'pregnancy complications' OR 'obstetric complication' OR 'obstetric complications' OR 'obstetric emergency' OR 'obstetric emergencies') AND ('developing country' OR 'middle income country' OR 'middle income countr*' OR 'low income country' OR 'global medicine' OR 'third world' OR 'underserved countr*' OR 'resource limited country' OR 'Imic*' OR 'low income economy' OR 'middle income economy' OR 'underdeveloped countr*' OR 'underdeveloped economy' OR 'poor countr*' OR 'poor nation' OR 'world health' OR 'middle-income countr*' OR 'transitional countr*' OR 'lower middle income

countr*' OR 'upper middle income' OR 'less developed countr*' OR 'lesser developed countr*' OR 'developing countr*' OR 'developing nation' OR 'lower-middle income countr*' OR 'uppermiddle income countr*' OR 'low-income countr*' OR 'deprived countr*' OR 'low gdp' OR 'lami countr*' OR 'poorer nation' OR 'under served countr*' OR 'under served nation' OR 'lower income population' OR 'low income population' OR 'developing world' OR 'africa' OR 'asia' OR 'caribbean' OR armenian OR aruba OR byelorussian OR belarus OR belorussian OR belorussia OR bosnia OR herzegovina OR hercegovina OR brasil OR 'comoro islands' OR comores OR 10 mayotte OR zaire OR 'ivory coast' OR 'slovak republic' OR 'french somaliland' OR 'east timur' 11 OR 'timor leste' OR 'united arab republic' OR 'gabonese republic' OR gaza OR 'georgia republic' 12 OR 'georgian republic' OR 'gold coast' OR guiana OR maldives OR 'isle of man' OR kazakh OR 13 kiribati OR kirghizia OR 'kyrgyz republic' OR kirghiz OR kirgizstan OR basutoland OR 'malagasy 14 republic' OR malaya OR malay OR sabah OR sarawak OR nyasaland OR 'marshall islands' OR 15 'agalega islands' OR moldovia OR moldovian OR ifni OR myanma OR burma OR 'northern 16 17 mariana islands' OR muscat OR palestine OR philipines OR philipines OR philippines OR 18 rumania OR roumania OR russian OR ruanda OR 'saint kitts' OR 'st kitts' OR nevis OR 'st lucia' 19 OR 'st vincent' OR 'samoan islands' OR 'navigator island' OR 'navigator islands' OR 'sao tome' 20 OR ceylon OR 'solomon islands' OR surinam OR tadzhikistan OR tadjikistan OR tadzhik OR 21 'togolese republic' OR turkmen OR 'soviet union' OR 'union of soviet socialist republics' OR 22 uzbek OR 'new hebrides' OR 'viet nam' OR 'west bank' OR rhodesia OR africa OR 'africa, 23 northern' OR 'africa south of the sahara' OR 'africa, central' OR 'africa, eastern or africa, 24 southern' OR 'africa, western or asia' OR 'asia, central' OR 'asia, southeastern' OR 'asia, 25 western' OR 'caribbean region' OR 'west indies' OR 'south america' OR 'latin america' OR 26 'central america' OR afghanistan OR albania OR algeria OR 'american samoa' OR angola OR 27 antigua OR barbuda OR argentina OR armenia OR azerbaijan OR bahrain OR bangladesh OR 28 barbados OR benin OR byelarus OR belize OR bhutan OR bolivia OR 'bosnia-herzegovina' OR 29 botswana OR brazil OR bulgaria OR 'cape verde' OR 'central african republic' OR chad OR 30 chile OR china OR colombia OR comoros OR congo OR 'costa rica' OR 'cote d ivoire' OR 31 croatia OR cuba OR cyprus OR czechoslovakia OR 'czech republic' OR slovakia OR djibouti 32 OR 'democratic republic of the congo' OR dominica OR 'dominican republic' OR 'east timor' OR 33 ecuador OR egypt OR 'el salvador' OR eritrea OR estonia OR ethiopia OR fiji OR gabon OR 34 gambia OR georgia OR ghana OR greece OR grenada OR guatemala OR guinea OR 'guinea-35 bissau' OR guam OR guyana OR haiti OR honduras OR hungary OR india OR indonesia OR 36 37 iran OR iraq OR jamaica OR jordan OR kazakhstan OR kenya OR korea OR kosovo OR 38 kyrgyzstan OR laos OR latvia OR lebanon OR lesotho OR liberia OR libya OR lithuania OR 39 macedonia OR madagascar OR malaysia OR malawi OR mali OR malta OR mauritania OR 40 mauritius OR mexico OR micronesia OR 'middle east' OR moldova OR mongolia OR morocco 41 OR mozambique OR myanmar OR namibia OR nepal OR 'netherlands antilles' OR 'new 42 caledonia' OR nicaragua OR niger OR nigeria OR oman OR pakistan OR palau OR panama OR 43 'papua new guinea' OR paraguay OR peru OR philippines OR poland OR portugal OR 'puerto 44 rico' OR romania OR russia OR rwanda OR 'saint lucia' OR 'saint vincent' OR grenadines OR 45 samoa OR 'saudi arabia' OR senegal OR serbia OR montenegro OR seychelles OR 'sierra 46 leone' OR slovenia OR 'sri lanka' OR somalia OR 'south africa' OR sudan OR suriname OR 47 swaziland OR syria OR tajikistan OR tanzania OR thailand OR togo OR tonga OR trinidad OR 48 tobago OR tunisia OR turkey OR turkmenistan OR uganda OR ukraine OR uruguay OR ussr 49 OR uzbekistan OR vanuatu OR venezuela OR vietnam OR yemen OR yugoslavia OR zambia 50 OR zimbabwe OR 'burkina faso' OR 'upper volta' OR burundi OR urundi OR cambodia OR 51 'khmer republic' OR kampuchea OR cameroon OR cameroons OR 'cameron or' AND camerons 52 OR 'cape verde' OR 'central african republic' 53 54 55

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56 57 58 Date of Initial Search: Feb 6, 2020; Date of second search: Nov 30 2020 TS= 'Access' AND ('availability' OR 'availabl*' OR 'affordab*' OR 'cost' OR 'distance' OR 'spatial' OR 'barrier' OR 'barriers' OR 'quality') ANDAND

(emergency responder" OR "emergency responders" OR "emergency doctor" OR "emergency doctors" OR "emergency clinician" OR "emergency clinicians" OR "emergency physician" OR "emergency physicians" OR "emergency personnel" OR "emergency medical personnel" OR "emergency service" OR "emergency services" OR "emergency medical service" OR "emergency medical services" OR "emergency medicine" OR "emergency health service" OR "emergency health services" OR "emergency care" OR "emergency healthcare" OR "emergency treatment" OR "emergency treatments" OR "emergency department" OR "emergency departments" OR "emergency room" OR "emergency rooms" OR "emergency ward" OR "emergency wards" OR "emergency unit" OR "emergency units" OR "emergency hospital" OR "emergency hospitals" OR "emergency clinic" OR "emergency clinics" OR "emergency setting" OR "emergency staff" OR "emergency response" OR "emergency medical technician" OR "emergency medical technicians" OR "paramedic" OR "paramedics" OR "ambulance" OR "ambulances" OR "ER" OR "first responder" OR "first responders" OR "rescue work" OR "rescue worker" OR "rescue workers" OR "relief work" OR "relief worker" OR "relief workers" OR "firefighter" OR "firefighters" OR "fire fighter" OR "fire fighters" OR "trauma center" OR "trauma centers" OR "trauma unit" OR "trauma units" OR "critical care" OR "critical illness" OR "critical illnesses" OR "resuscitation" OR "shock" OR "sepsis" OR "septicemia" OR "septicaemia" OR "acute care" OR "acute disease" OR "acute diseases" OR "prehospital" OR "pre hospital" OR "wound" OR "wounds" OR "triage" OR "pregnancy complication" OR "pregnancy complications" OR "obstetric complication" OR "obstetric complications" OR "obstetric emergency" OR "obstetric emergencies") AND

TS=("developing countr*" OR "developing nation*" OR "developing population*" OR "less developed countr*" OR "less developed nation*" OR "less developed population*" OR "lesser developed countr*" OR "lesser developed nation*" OR "lesser developed population*" OR "lesser developed world" OR "least developed countr*" OR "least developed nation*" OR "least developed population*" OR "least developed world" OR "under developed countr*" OR "under developed nation*" OR "under developed population*" OR "under developed world" OR "underdeveloped countr*" OR "underdeveloped nation*" OR "underdeveloped population*" OR "underdeveloped world" OR "middle income countr*" OR "middle income nation*" OR "middle income population*" OR "low income countr*" OR "low income nation*" OR "low income population" OR "low income population*" OR "lower income countr*" OR "lower income nation*" OR "lower income population*" OR "underserved countr*" OR "underserved nation*" OR "underserved population*" OR "underserved world" OR "under served countr*" OR "under served nation*" OR "under served population*" OR "under served world" OR "deprived countr*" OR "deprived nation*" OR "deprived population*" OR "deprived world" OR "poor countr*" OR "poor nation*" OR "poor population*" OR "poor world" OR "poorer countr*" OR "poorer nation*" OR "poorer population*" OR "poorer world" OR "developing econom*" OR "less developed econom*" OR "lesser developed econom*" OR "under developed econom*" OR "underdeveloped econom*" OR "middle income econom*" OR "low income econom*" OR "lower income econom*" OR "low gdp" OR "low gnp" OR "low gross domestic" OR "low gross national" OR "lower gdp" OR "lower gnp" OR "lower gross domestic" OR "lower gross national" OR Imic OR Imics OR "third world" OR "lami countr*" OR "transitional countr*" OR Africa OR Asia OR Caribbean OR West Indies OR South America OR Latin America OR Central America OR Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR

Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brasil OR Brazil OR Bulgaria OR Burkina Faso OR Burkina Fasso OR Upper Volta OR Burundi OR Urundi OR Cambodia OR Khmer Republic OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR Cape Verde OR Central African Republic OR Chad OR Chile OR China OR Colombia OR Comoros OR Comoro Islands OR Comores OR Mayotte OR Congo OR Zaire OR Costa Rica OR Cote d'Ivoire OR Ivory Coast OR Croatia OR Cuba OR Cyprus OR 10 Czechoslovakia OR Czech Republic OR Slovakia OR Slovak Republic OR Djibouti OR French 11 Somaliland OR Dominica OR Dominican Republic OR East Timor OR East Timur OR Timor 12 Leste OR Ecuador OR Egypt OR United Arab Republic OR El Salvador OR Eritrea OR Estonia 13 OR Ethiopia OR Fiji OR Gabon OR Gabonese Republic OR Gambia OR Gaza OR Georgia 14 Republic OR Georgian Republic OR Ghana OR Gold Coast OR Greece OR Grenada OR 15 Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary 16 17 OR India OR Maldives OR Indonesia OR Iran OR Irag OR Isle of Man OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR 18 19 Kirghizia OR Kyrgyz Republic OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Latvia OR 20 Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya OR Lithuania OR Macedonia OR 21 Madagascar OR Malagasy Republic OR Malaysia OR Malaya OR Malay OR Sabah OR 22 Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR Marshall Islands OR Mauritania OR 23 Mauritius OR Agalega Islands OR Mexico OR Micronesia OR Middle East OR Moldova OR 24 Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambigue 25 OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR Netherlands Antilles OR New 26 Caledonia OR Nicaragua OR Niger OR Nigeria OR Northern Mariana Islands OR Oman OR 27 Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR 28 Philippines OR Philippines OR Philippines OR Philippines OR Poland OR Portugal OR Puerto 29 Rico OR Rhodesia OR Romania OR Rumania OR Roumania OR Russia OR Russian OR 30 Rwanda OR Ruanda OR Saint Kitts OR St Kitts OR Nevis OR Saint Lucia OR St Lucia OR 31 Saint Vincent OR St Vincent OR Grenadines OR Samoa OR Samoan Islands OR Navigator 32 Island OR Navigator Islands OR Sao Tome OR Saudi Arabia OR Senegal OR Serbia OR 33 Montenegro OR Seychelles OR Sierra Leone OR Slovenia OR Sri Lanka OR Ceylon OR 34 Solomon Islands OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria 35 OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo 36 37 OR Togolese Republic OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR 38 Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uruguay OR USSR OR Soviet Union 39 OR Union of Soviet Socialist Republics OR Uzbekistan OR Uzbek OR Vanuatu OR New 40 Hebrides OR Venezuela OR Vietnam OR Viet Nam OR West Bank OR Yemen OR Yugoslavia 41 OR Zambia OR Zimbabwe) 42

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OR "emergency medical technician" OR "emergency medical technicians" OR "paramedic" OR "paramedics" OR "ambulance" OR "ambulances" OR "ER" OR "first responder" OR "first responders" OR "rescue work" OR "rescue worker" OR "rescue workers" OR "relief work" OR "relief worker" OR "relief workers" OR "firefighter" OR "firefighters" OR "fire fighter" OR "fire fighters" OR "trauma center" OR "trauma centers" OR "trauma unit" OR "trauma units" OR "critical care" OR "critical illness" OR "critical illnesses" OR "resuscitation" OR "shock" OR "sepsis" OR "septicemia" OR "septicaemia" OR "acute care" OR "acute disease" OR "acute 10 diseases" OR "prehospital" OR "pre hospital" OR "wound" OR "wounds" OR "triage" OR "pregnancy complication" OR "pregnancy complications" OR "obstetric complication" OR 12 "obstetric complications" OR "obstetric emergency" OR "obstetric emergencies") AND 13 ("developing countr*" OR "developing nation*" OR "developing population*" OR "less developed 14 countr*" OR "less developed nation*" OR "less developed population*" OR "lesser developed 15 countr*" OR "lesser developed nation*" OR "lesser developed population*" OR "lesser 16 17 developed world" OR "least developed countr*" OR "least developed nation*" OR "least developed population*" OR "least developed world" OR "under developed countr*" OR "under 18 developed nation*" OR "under developed population*" OR "under developed world" OR 19 20 "underdeveloped countr*" OR "underdeveloped nation*" OR "underdeveloped population*" OR 21 "underdeveloped world" OR "middle income countr*" OR "middle income nation*" OR "middle 22 income population*" OR "low income countr*" OR "low income nation*" OR "low income 23 population" OR "low income population*" OR "lower income countr*" OR "lower income nation*" 24 OR "lower income population*" OR "underserved countr*" OR "underserved nation*" OR 25 "underserved population*" OR "underserved world" OR "under served countr*" OR "under 26 served nation*" OR "under served population*" OR "under served world" OR "deprived countr*" 27 OR "deprived nation*" OR "deprived population*" OR "deprived world" OR "poor countr*" OR 28 "poor nation*" OR "poor population*" OR "poor world" OR "poorer countr*" OR "poorer nation*" 29 OR "poorer population*" OR "poorer world" OR "developing econom*" OR "less developed 30 econom*" OR "lesser developed econom*" OR "under developed econom*" OR 31 "underdeveloped econom*" OR "middle income econom*" OR "low income econom*" OR "lower 32 income econom*" OR "low gdp" OR "low gnp" OR "low gross domestic" OR "low gross national" 33 OR "lower gdp" OR "lower gnp" OR "lower gross domestic" OR "lower gross national" OR Imic 34 OR Imics OR "third world" OR "lami countr*" OR "transitional countr*" OR Africa OR Asia OR 35 Caribbean OR West Indies OR South America OR Latin America OR Central America OR 36 37 Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR 38 Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR 39 Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR 40 Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brasil OR 41 Brazil OR Bulgaria OR Burkina Faso OR Burkina Fasso OR Upper Volta OR Burundi OR Urundi 42 OR Cambodia OR Khmer Republic OR Kampuchea OR Cameroon OR Cameroons OR 43 Cameron OR Camerons OR Cape Verde OR Central African Republic OR Chad OR Chile OR 44 China OR Colombia OR Comoros OR Comoro Islands OR Comores OR Mayotte OR Congo 45 OR Zaire OR Costa Rica OR Cote d'Ivoire OR Ivory Coast OR Croatia OR Cuba OR Cyprus OR 46 Czechoslovakia OR Czech Republic OR Slovakia OR Slovak Republic OR Djibouti OR French 47 Somaliland OR Dominica OR Dominican Republic OR East Timor OR East Timur OR Timor 48 Leste OR Ecuador OR Egypt OR United Arab Republic OR El Salvador OR Eritrea OR Estonia 49 OR Ethiopia OR Fiji OR Gabon OR Gabonese Republic OR Gambia OR Gaza OR Georgia 50 Republic OR Georgian Republic OR Ghana OR Gold Coast OR Greece OR Grenada OR 51 Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary 52 OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Isle of Man OR Jamaica OR Jordan 53 OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR 54 Kirghizia OR Kyrgyz Republic OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Latvia OR 55 Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya OR Lithuania OR Macedonia OR 56 57 58 59

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Global Index Medicus: Search results: 526

Initial Search Date: Feb 6, 2020

OR Zambia OR Zimbabwe))

Updated search: 18

Access AND (availability OR availabl* OR affordab* OR cost OR distance OR spatial OR barrier OR barriers OR quality) AND ("emergency responder" OR "emergency responders" OR "emergency doctor" OR "emergency doctors" OR "emergency clinician" OR "emergency clinicians" OR "emergency physician" OR "emergency physicians" OR "emergency personnel" OR "emergency medical personnel" OR "emergency service" OR "emergency services" OR "emergency medical service" OR "emergency medical services" OR "emergency medicine" OR "emergency health service" OR "emergency health services" OR "emergency care" OR "emergency healthcare" OR "emergency treatment" OR "emergency treatments" OR "emergency department" OR "emergency departments" OR "emergency room" OR "emergency rooms" OR "emergency ward" OR "emergency wards" OR "emergency unit" OR "emergency units" OR "emergency hospital" OR "emergency hospitals" OR "emergency clinic" OR "emergency clinics" OR "emergency setting" OR "emergency staff" OR "emergency response" OR "emergency medical technician" OR "emergency medical technicians" OR "paramedic" OR "paramedics" OR "ambulance" OR "ambulances" OR "ER" OR "first responder" OR "first responders" OR "rescue work" OR "rescue worker" OR "rescue workers" OR "relief work" OR "relief worker" OR "relief workers" OR "firefighter" OR "firefighters" OR "fire fighter" OR "fire fighters" OR "trauma center" OR "trauma centers" OR "trauma unit" OR "trauma units" OR "critical care" OR "critical illness" OR "critical illnesses" OR "resuscitation" OR "shock" OR "sepsis" OR "septicemia" OR "septicaemia" OR "acute care" OR "acute disease" OR "acute diseases" OR "prehospital" OR "pre hospital" OR "wound" OR "wounds" OR "triage" OR "pregnancy complication" OR "pregnancy complications" OR "obstetric complication" OR "obstetric complications" OR "obstetric emergency" OR "obstetric emergencies")

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Dr. Alexandra Hartman

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	NA
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5-6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5-6, Supplement
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6-7
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	7



St. Michael's

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	NA
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	7-8
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	8
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	8-9
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	9-12
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	9-12
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	12-13
Limitations	20	Discuss the limitations of the scoping review process.	14
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	15
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	1

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
 ‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the

process of data extraction in a scoping review as data charting. § The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.



BMJ Open

Defining Measures of Emergency Care Access in Low- and Middle-Income Countries: A scoping review

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Date Submitted by the Author:	15-Dec-2022
Complete List of Authors:	Hirner, Sarah; University of Colorado Denver School of Medicine Dhakal, Jyotshila; University of Colorado Denver Broccoli, Morgan; Brigham and Women's Hospital, Emergency Medicine Ross, Madeline; University of Colorado Denver School of Medicine, Department of Emergency Medicine Calvello Hynes, Emilie; University of Colorado Denver School of Medicine, Emergency Medicine Bills, Corey; University of Colorado Denver School of Medicine, Department of Emergency Medicine
Primary Subject Heading :	Emergency medicine
Secondary Subject Heading:	Emergency medicine, Global health, Health policy, Public health
Keywords:	ACCIDENT & EMERGENCY MEDICINE, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, International health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PUBLIC HEALTH

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1 Title: Defining Measures of Emergency Care Access in Low- and Middle-I	ncome
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- 2 Countries: A scoping review
- 3 Short Title: Access measures of emergency care in LMICs
- 4 Authors
- 5 Sarah Hirner, MS (1)
- 6 Jyotshila Dhakal (2)
- 7 Morgan C Broccoli (3)
- 8 Madeline Ross (4)
- 9 Emilie Calvello Hynes (4)
- 10 Corey B Bills (4)*
- 11

1

- 12 1. University of Colorado, School of Medicine, Aurora CO
- 13 2. University of Colorado Denver, Denver CO
- 3. Brigham and Women's Hospital, Department of Emergency Medicine, Boston MA 14
 - re, De, 15 4. University of Colorado, School of Medicine, Department of Emergency Medicine, Aurora, CO 16

17

- 18 *Corresponding Author
- 19 Corey B Bills
- 20 (ORCID: 0000-0002-3456-6008)
- 21 University of Colorado
- 22 School of Medicine
- 23 Department of Emergency Medicine
- 24 Leprino Building, 12401 E 17th Ave, Aurora CO 80045
- 25 Email: Corey.bills@cuanschutz.edu
- 26 Phone: 9174148899

- Number of references: 39 28
- 29 Abstract word count: 290
- 30 Word count: 3785 58
- 59 31 60

Abstract

1

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Objectives: Over 50% of annual deaths in low and middle-income countries (LMICs)

understand and address relevant barriers to emergency care systems, we performed

Methods: We searched PubMed, Embase, Web of Science, CINAHL, and the gray

literature for English language studies published between January 1, 1990, and

December 30, 2020 that described one or more discrete measure(s) of access to

emergency or acute care health services in LMICs. A structured data extraction tool

was used to identify and classify the number of 'unique' measures, and the number

of times each unique measure was studied in the literature ('total' measures).

Measures of access were categorized by access type, defined by Thomas and

Penchansky, with further categorization according to the 'Three Delay' model of

Results: A total of 3103 articles were screened. 75 met full study inclusion. Articles

reported. Unique measures of accommodation (n=42, 30.7%) and availability (n=40,

29.2%) were most common. Measures of seeking, reaching, and receiving care were

slightly more measures focused on prehospital care—inclusive of care at the scene

and through transport to a facility (n=76, 55.4%) as compared to facility-based care

were uniformly descriptive (n=75, 100%). 137 discrete measures of access were

22 (16.0%), 46 (33.6%), and 69 (50.4%), respectively. According to the ECSF

seeking, reaching, and receiving care, and the World Health Organization's

could be averted through access to high-quality emergency care. In order to

a scoping review of all English language literature that described at least one

measure of emergency care access in LMICs.

Emergency Care Systems Framework (ECSF).

(n=57, 41.6%).

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31 32 33	44
34 35	45
36 37	46
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1 2		
3 4	56	Conclusions: Numerous measures of emergency care access are described in the
5 6	57	literature, but many measures are over addressed. Development of a core set of
7 8 9	58	access measures with associated minimum standards are necessary to aid in
10 11	59	ensuring universal access to high-quality emergency care in all settings.
12 13 14 15 16	60 61	Strengths and Limitations
17 18	62	This is the first study to synthesize available measures of emergency
19 20 21	63	healthcare access in low and middle-income countries.
22 23	64	The large volume of work on indicators of emergency care access shows
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41	65	substantial gaps and may help to future work on how to ensure universal
	66	access to high-quality emergency care in all settings.
	67	This study is limited to the available English-language literature.
	68	Given limitations in the data, we cannot comment on the feasibility of
	69	implementing the categorized access measures, provide consensus on which
	70	measures correspond to more likely improvements in patient outcomes, nor
	71	provide minimum standards for measures.
42 43 44	72	
45 46 47	73	Introduction
48 49 50	74	The past 20 years have been called a golden age of public health. (1) A dramatic
50 51 52 53 54 55 56 57	75	increase in global health funding has expanded health care resources in low- and
	76	middle-income countries (LMICs). (2-4) As a result, significant reductions in
	77	infectious disease-related, neonatal, and maternal mortality have been achieved in
57 58 59	78	line with the United Nations Millennium Development Goals. (5) Further reductions in
60	79	global mortality attributable to non-communicable diseases and trauma has been far

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less substantial. (6) While a shift from disease specific programs to health system strengthening, equity, and social protection has been an important first step, progress on current Sustainable Development Goals remains lacking and has been further hampered by existing health inequities made worse by the COVID-19 pandemic. (7) Improvements in both prehospital and facility-based emergency care have the potential to impact many of the SDGs, lead to marked improvements in healthcare systems, and reduce deaths across multiple disease categories.(8) Estimates suggest that over 50% of annual deaths in LMICs could be averted by the implementation of quality emergency care systems. (9-12) The increasing mortality burden of non-communicable diseases, including injury and chronic conditions, coupled with the acute medical needs of emerging pandemics, such as SARS-CoV-2, requires the development of robust emergency care systems. (1, 13, 14) In 2018, the World Health Assembly passed resolution 72.16. ensuring the role of emergency care in all health systems. (15) In order to provide further clarity to practitioners and policy makers on the role of emergency care, the WHO developed the Emergency Care System Framework (ECSF). The Framework defines a set of core essential functions of an emergency care system at the scene of illness, during transport, and within health facilities. (16) Unfortunately, many who live in resource-limited settings lack access to the human resources, equipment and information technologies needed for a capable high functioning emergency care system. (17) Previous descriptions of known measures of emergency care quality (18, 19) and barriers to emergency care access (20, 21) have highlighted gaps in emergency care in LMICs, but no comprehensive review on measures of emergency care

¹ 104 access in LMICs has been completed to date. The aim of this scoping review is to

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categorize all known measures of emergency care access in LMICs in order to help
standardize and prioritize emergency care development.

108 Materials and Methods:

109 Search Strategy

A rigorous search strategy was employed with the goal of identifying all peer-reviewed studies that described measures of access to emergency care in LMICs. For this review we use the term measure to describe indicators, metrics, and other measurable components of access to emergency care. We performed a scoping review using the following databases: PubMed, Embase, Web of Science, and CINAHL. A subsequent gray literature search was conducted via both Google and Google Scholar, with searches targeted toward organizations thought work on global emergency care.

The initial search strategy (Supplementary Material: Appendix 1) was developed within PubMed and adapted for the remaining databases. Search terms included various iterations of access, emergency care, and LMICs. Free text terms and standardized MeSH headings/subheadings were utilized to optimize sensitivity for relevant literature while minimizing excess search results. The reference lists of relevant primary studies and reviews likely to meet inclusion criteria were also reviewed manually to both verify search sensitivity and identify other potentially relevant studies that were not identified by the electronic search. The initial search was performed in 2020, with a subsequent updated search in November 2022.

⁵⁷ 127 The gray literature search was completed via Google and Google Scholar. We
 ⁵⁹ 128 performed targeted searches using similar terms relevant to access, including

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2 3 4	129	affordability and barriers to care. The search was targeted toward government
5 6	130	ministries of health, professional organizations specific to emergency care, and
7 8 9	131	among well-established non-governmental organizations, including development
10 11	132	agencies and those specific to healthcare policy. There was no initial regional or
12 13	133	income level specifications given to this search.
14 15 16	134	Studies published between January 1, 1990, and December 30, 2020,
17 18	135	English-language, and describing at least one discrete measure of access to
19 20 21	136	emergency care services in at least one LMIC were included. LMICs were defined by
22 23	137	World Bank economic definitions as the Gross National Income (GNI) per capita of
24 25	138	the year the research was performed. Articles were excluded that were clearly
26 27 28	139	irrelevant to the topic, did not involve emergency care, did not describe a measure of
29 30	140	access or measurable barrier to emergency care, or did not include data from at
31 32	141	least one LMIC. For the purposes of this review, we excluded data specific to
33 34 35	142	emergency obstetric and newborn care seeking (EmONC; we anticipate a separate
36 37	143	forthcoming review on the subject). As a scoping review, this manuscript does not
38 39	144	involve human subjects and is exempt from ethics review based on the
40 41 42	145	corresponding author's IRB.
43 44	146	Patient and Public Involvement
45 46 47	147	Given the nature of this study it was not possible to involve patients or the public in
47 48 49	148	the design, or conduct, or reporting, or dissemination plans of our research.
50 51	149	Data Processing
52 53 54	150	Manuscripts meeting initial broad search criteria were imported into Covidence
55 56	151	(Covidence systematic review software, Veritas Health Innovation, Melbourne,
57 58 59 60	152	Australia) and duplicates removed. Initial title and abstract review were performed by

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two independent authors (SH, JD). Disagreements were resolved by a third reviewer
(CB). The same procedure was followed for full text review.
Data from included manuscripts were extracted and included the following:
author(s) and full citation, publication date and study timeframe, location, study type,

157 setting, methodology, access measure(s) reported, and the primary outcome(s).

158 Countries under study were categorized by income level, WHO region, whether the

159 study was local, regional, national or multinational in scale, and whether the

160 populations under study were rural or urban.

161 Data Analysis

A structured data extraction tool was used to identify and classify both the number of 'unique' measures, and the number of times a unique measure was studied in the literature. In this manuscript the summation of all of the times each unique measure was studied is referred to as 'total' measures. Unique access measures were aggregated and categorized by access type.

The term "access" is often used as shorthand for distance, leading to a focus on individual patient proximity, either spatial or temporal, to a given health service. (22) While vital, proximity is but one component of accessibility and may not correlate with the true ability to receive quality emergency care. (23) For this scoping review we revert back to a more expansive definition of access, one rooted in a rights-based approach to emergency care and reflecting the spectrum of fit between user and service and inclusive of five dimensions of access-availability, accessibility, accommodation, affordability, and acceptability-as described by Penchansky and Thomas. (Table 1; 24-25) We also reference a modified version of this framework which includes awareness. (26) In Penchansky and Thomas' framework, access is examined through the "fit" of the patient with the health care

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3 4	178	syst	em. For example, a health care	e facility may be available	e (that is, it exists), but not			
5 6	179	acc	essible because of transportation	on barriers. In addition, th	ne health care facility may			
7 8 9 10 11	180	not	have necessary measures to a	ccommodate a patient (s	such as 24-hour-access or			
	181	chile	dcare), may be unaffordable, or	may be unacceptable (i	.e., due to poor quality or			
12 13	182	corr	uption). While dates, and origin	ally validated in the cons	sumer patient satisfaction			
14 15 16	183	wor	ld, multiple recent studies on he	ealthcare access in low-	and middle-income			
17 17 18	184	studies have shown utility and validity for this framework, including among geriatric						
19 20	185	hea	lthcare in Southeast Asia, on H	IV treatment access duri	ng Covid in Ghana, and			
21 22	186	amo	ong displaced in the Lake Chad	region of Cameroon, Ch	nad, Niger and Nigeria.			
23 24 25	187	(27-	29)					
26 27 28	188 189	Table 1. Proposed Emergency Care Access Measures for Monitoring, Evaluation and Comparative Analysis by Access Type						
29 30	190							
31	191							
32 33	192							
34 35	Access T	уре	Definition from Penchansky and Thomas	Adapted definition for emergency care	Proposed sample emergency care access measures			
36 37	Availability		The relationship of the volume and type of existing services to the clients' volume and	The relationship between EU services and those seeking EC.	Number of EC beds per catchment area Presence of drug, technology, or interventions			
38			types of needs	services and those seeking LC.	specific to EC			
39					Presence of EC clinicians 24 hours a day Percent of clinicians with EC training			
40 -	Accessibility	v	The relationship between the location of		r crocht of on notaris with Eo training			
41	71000000101111	y	The relationship between the location of supply and the location of clients, taking	The proximity (in time and	Distance to closest emergency care facility			
42			supply and the location of clients, taking	The proximity (in time and space) of a patient to EU care.	Distance to closest emergency care facility Time to closest emergency care facility			
12			supply and the location of clients, taking account of client transportation resources		Time to closest emergency care facility Available transport			
43 44			supply and the location of clients, taking		Time to closest emergency care facility			
44 45 -	Affordability	/	supply and the location of clients, taking account of client transportation resources and travel time, distance and cost	space) of a patient to EU care.	Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care			
44 45 46 47	Affordability	/	supply and the location of clients, taking account of client transportation resources and travel time, distance and cost The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and	Space) of a patient to EU care. The cost of EU services and care, relative to patient's household income and ability to	Time to closest emergency care facility Available transport Time associated with transport			
44 45 46	Affordability	/	supply and the location of clients, taking account of client transportation resources and travel time, distance and cost The relationship of prices of services and providers' insurance or deposit requirements	space) of a patient to EU care. The cost of EU services and care, relative to patient's	Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care Cost to access initial EC service Cost of individual services specific to EC (specific			
44 45 46 47 48	Affordability		supply and the location of clients, taking account of client transportation resources and travel time, distance and cost The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance. The relationship between the manner in	 space) of a patient to EU care. The cost of EU services and care, relative to patient's household income and ability to pay. The manner in which EU 	Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care Cost to access initial EC service Cost of individual services specific to EC (specific to individual care type) Overall EC cost per visit Hours of operation of EU			
44 45 46 47 48 49			supply and the location of clients, taking account of client transportation resources and travel time, distance and cost The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance. The relationship between the manner in which the supply resources are organized to	 space) of a patient to EU care. The cost of EU services and care, relative to patient's household income and ability to pay. The manner in which EU services are organized (time of 	Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care Cost of access initial EC service Cost of individual services specific to EC (specific to individual care type) Overall EC cost per visit Hours of operation of EU Number of transfers per patient			
44 45 46 47 48 49 50			supply and the location of clients, taking account of client transportation resources and travel time, distance and cost The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance. The relationship between the manner in which the supply resources are organized to accept clients (including appointment systems, hours of operation, walk-in facilities, telephone services) and the clients' ability to accommodate to these factors and the clients' perception of their	 space) of a patient to EU care. The cost of EU services and care, relative to patient's household income and ability to pay. The manner in which EU 	Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care Cost to access initial EC service Cost of individual services specific to EC (specific to individual care type) Overall EC cost per visit Hours of operation of EU			
44 45 46 47 48 49 50 51 52 53 54		ation	supply and the location of clients, taking account of client transportation resources and travel time, distance and cost The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance. The relationship between the manner in which the supply resources are organized to accept clients (including appointment systems, hours of operation, walk-in facilities, telephone services) and the clients' ability to accommodate to these factors and the clients' perception of their appropriateness The relationship of clients' attitudes about	space) of a patient to EU care. The cost of EU services and care, relative to patient's household income and ability to pay. The manner in which EU services are organized (time of operation, level of training and services able to be rendered) relative to a patient's need. The relationship between a	Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care Cost of access initial EC service Cost of individual services specific to EC (specific to individual care type) Overall EC cost per visit Hours of operation of EU Number of transfers per patient Average EU time to provider Training provided per specific EU interventions Understanding of how to navigate EC system			
44 45 47 48 49 50 51 52 53 54 55	Accommod	ation	supply and the location of clients, taking account of client transportation resources and travel time, distance and cost The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance. The relationship between the manner in which the supply resources are organized to accept clients (including appointment systems, hours of operation, walk-in facilities, telephone services) and the clients' ability to accommodate to these factors and the clients' perception of their appropriateness The relationship of clients' attitudes about personal and practice characteristics of	space) of a patient to EU care. The cost of EU services and care, relative to patient's household income and ability to pay. The manner in which EU services are organized (time of operation, level of training and services able to be rendered) relative to a patient's need. The relationship between a patient's individual belief system	Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care Cost of access initial EC service Cost of individual services specific to EC (specific to individual care type) Overall EC cost per visit Hours of operation of EU Number of transfers per patient Average EU time to provider Training provided per specific EU interventions Understanding of how to navigate EC system Acceptability of EU care			
44 45 47 48 49 50 51 52 53 54 55 56 57 58	Accommod	ation	supply and the location of clients, taking account of client transportation resources and travel time, distance and cost The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance. The relationship between the manner in which the supply resources are organized to accept clients (including appointment systems, hours of operation, walk-in facilities, telephone services) and the clients' ability to accommodate to these factors and the clients' perception of their appropriateness The relationship of clients' attitudes about personal and practice characteristics of existing providers, as well as to provider attitudes about acceptable personal	 space) of a patient to EU care. The cost of EU services and care, relative to patient's household income and ability to pay. The manner in which EU services are organized (time of operation, level of training and services able to be rendered) relative to a patient's need. The relationship between a patient's individual belief system and larger socio-cultural attributes and their willingness 	Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care Cost of access initial EC service Cost of individual services specific to EC (specific to individual care type) Overall EC cost per visit Hours of operation of EU Number of transfers per patient Average EU time to provider Training provided per specific EU interventions Understanding of how to navigate EC system			
44 45 47 48 49 50 51 52 53 54 55 56 57	Accommod	ation	supply and the location of clients, taking account of client transportation resources and travel time, distance and cost The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance. The relationship between the manner in which the supply resources are organized to accept clients (including appointment systems, hours of operation, walk-in facilities, telephone services) and the clients' ability to accommodate to these factors and the clients' perception of their appropriateness The relationship of clients' attitudes about personal and practice characteristics of existing providers, as well as to provider	space) of a patient to EU care. The cost of EU services and care, relative to patient's household income and ability to pay. The manner in which EU services are organized (time of operation, level of training and services able to be rendered) relative to a patient's need. The relationship between a patient's individual belief system and larger socio-cultural	Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care Cost of individual services specific to EC (specific to individual care type) Overall EC cost per visit Hours of operation of EU Number of transfers per patient Average EU time to provider Training provided per specific EU interventions Understanding of how to navigate EC system Acceptability of EU care Acceptability of EU conduct or attitudes			

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1 2		
3 4	194	More recently other models have emerged that may provide greater
5 6	195	applicability to emergency care. With this in mind we provide analyses and
7 8 9	196	categorize access measures via two additional frameworks. The 'Three Delay'
9 10 11	197	model, was originally conceptualized to understand delays in care leading to
12 13	198	increased maternal mortality but has been more recently applied to emergency care.
14 15	199	(30, 31) The Three Delay model defines three critical phases of timely care: seeking,
16 17 18	200	reaching, and receiving care. The World Health Organization's ECSF provides
19 20	201	another method of understanding emergency care access. The ECSF defines the
21 22	202	human resources, equipment, and functions necessary for a fully functioning
23 24 25	203	emergency care system at the scene of illness, during transport to a health facility
25 26 27	204	(prehospital), and within healthcare facilities. (9, 16)
28 29	205	All extracted access measures were collected, with similar measures
30 31	206	collapsed into singular unique measures. We report the number of unique measures
32 33 34	207	and the total number of times a measure is reported as a number and percent. Each
35 36	208	measure was than categorized according to the three frameworks listed above.
37 38	209	Given the heterogeneity of study methods and types, a qualitative analysis and
39 40 41	210	narrative synthesis was undertaken. Thematic analyses focused on the number and
41 42 43	211	general quality of the measures used. Trends and ranges among studies with
44 45	212	comparable numeric measures are reported where appropriate. We did not perform
46 47	213	a grading of the literature given the overall observational nature of most studies.
48 49 50	214	Criteria proposed by the Preferred Reporting Items for Systematic Reviews and
51 52	215	Meta-analyses Extension for Scoping Reviews statement were adhered to in
53 54	216	reporting.(32)
55 56 57	217	Results
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A total of 3103 articles were identified for screening via database searches, and 30
were included from the gray literature and hand searches of relevant literature
(Figure 1). After removal of 993 duplicates, 2140 articles were screened by title and
abstract, 203 articles met criteria for full text screening, after which 128 articles were
excluded. In sum, 75 articles met full criteria for inclusion. (Supplementary Material,
eTable 1)

[Insert] Figure 1. Prisma Flow Diagram for review of literature on access to
emergency care measures in LMICs.

All but one of the 75 studies were published in peer-reviewed journals. The majority (n=44, 58.7%) of studies examined access related to general emergency care; 22 (29.3%) were relevant to prehospital care, 10 (13.3%) were specific to trauma care, and one (1.3%) article focused on pediatric patients. (Table 2) Geographically, publications included data from all six WHO regions, with the majority from the African Region (n=35, 46.7%). The majority of included studies originated from lower-middle income countries (n=37, 49.30%), with additional studies from upper-middle income countries (n=15, 20.0%) and low-income countries (n=11, 14.7%). Twelve articles (16.0%) included data from multiple income groups.

³ 235

Table 2. Characteristics of manuscripts for study inclusion

Characteristic	N (%)
	N=75
Country	
Multinational	12 (16.0)
Ghana	7 (9.3)
Pakistan	6 (8.0)
Kenya	5 (6.7)
India	5 (6.7)
South Africa	4 (5.3)
Brazil	3 (4.0)
Other*	32 (42.7)
WHO Region	

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Africa	35 (46.7)	
Americas	7 (9.3)	
Eastern Mediterranean	5 (6.7)	
European	1 (1.3)	
South-East Asia	15 (20.0)	
Western Pacific	7 (9.3)	
Multiple WHO Regions	5 (6.7)	
Income level		
Low	11 (14.7)	
Lower-middle	37 (49.3)	
Upper-middle	15 (20.0)	
Multiple	12 (16.0)	
Settings		
Local	9 (12.0)	
Regional	34 (45.3)	
National	20 (26.7)	
Multinational	12 (16.0)	
Setting if Local or Regional**		
Urban	8 (18.6)	
Rural	32 (74.4)	
Both	3 (2.3)	
Article Type	0 (2.0)	
Quantitative	24 (32.0)	
Qualitative	47 (62.7)	
Mixed	4 (5.3)	
Methodology	4 (5.5)	
	11 (19 7)	
Descriptive (Interview)	14 (18.7)	
Descriptive (Survey)	13 (17.3)	
Cross sectional	43 (57.3)	
Mixed methods	5 (6.7)	
Observational pre/post (Cohort, RCT)	0 (0.0)	
Population focus	44 (50 7)	
General EM care	44 (58.7)	
Prehospital care	22 (29.3)	
Trauma care	10 (13.3)	
Pediatrics	1 (1.3)	
Number of study participants		
0-50	7 (9.3)	
51-100	3 (4.0)	
101-500	9 (12.0)	
501-2000	1 (1.3)	
>2000	7 (9.3)	
Not reported	48 (64.0)	

237 nduras, Iran, Malaysia,

238 Nigeria, Philippines, Rwanda, Samoa, Solomon Islands, Sierra Leone, Sudan, Tanzania,

239 Thailand, Vietnam, Yugoslavia, Zambia, Zimbabwe 58

59 240 **N= 43 60

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1 2		
3 4 5 6 7 8 9 10 11 12 13	241	Methodologically, all studies were descriptive and relied on key informant
	242	interviews (n=14, 18.7%), surveys (n=13, 17.3%), or cross-sectional data (n=43,
	243	57.3%). No manuscript reported a comparator group, and the majority of studies
	244	were qualitative in nature (n=47, 62.7%). Studies varied in the number and type
	245	(patients, clinical providers, administrators) of participants. The majority of studies
14 15	246	(n=48, 64.0%) used cross-sectional data and did not specify the number of
16 17	247	participants. Participant enrollment ranged from 11 to 32,774 individuals. The types
18 19 20	248	of health facilities under study also varied, and included emergency care as
21 22 23 24	249	accessed at clinics, district hospitals, referral hospitals (with access to intensive
	250	care), and more formal emergency units or departments.
25 26 27	251	Measures by access type
27 28 29 30 31 32 33 34 35 36	252	In sum, 137 unique measures of access were described in the 68 studies (Table 3).
	253	Of the 75 total studies, most (n=49, 72.1%) reported more than one unique measure.
	254	Based on Penchansky and Thomas' categories, the highest number of discrete
	255	measures of access described accommodation (n=42, 30.7%), followed by
37 38	256	availability (n=40, 29.2%). In many instances, a single measure was studied
39 40	257	reported more than once leading to a total of 306 total measurements. Among total
41 42	258	measures, measures of availability (n=120, 35.7%) were disproportionality over
43 44 45	259	represented while measures of affordability were underrepresented (n=34, 10.1%).
45 46 47		
48 49	260	Table 3. Unique and total number of access measure categorized by access
49 50 51	261	type
52		Access actoremy Unique measures Total measures

Access category	Unique measures	Total measures	
	N=137 (%)	N=336 (%)	
Availability	40 (29.2)	120 (35.7)	
Accessibility	19 (13.9)	66 (19.6)	
Accommodation	42 (30.7)	62 (18.5)	
Affordability	17 (12.4)	34 (10.1)	
Acceptability*	19 (13.9)	54 (16.1)	

Unique measures of availability, defined as the relationship of the volume and type of

existing services to the clients' volume and types of needs, totaled 40 (29.2%; Table

1). Total measures of affordability were studied most often (n=120, 35.7%, Table 4).

Of the unique measures, most (n=29, 72.5%) focused on receiving care.

Measurements on receiving care often measured the presence or lack of basic

emergency health facilities and resources relevant to emergency care. There was

heterogeneity when describing resource service availability, such as the availability

service (e.g., blood smears for malaria). Measures owing to the presence or absence

of emergency radiologic services (e.g., CT and MRI) and emergency laboratory

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27 28	272
29 30	273
31 32 33	274
33 34 35	275
36 37	275
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40 41 42	277
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62 *Awareness accounted for 4 of the unique measures

63 Availability

of clinical providers with qualifications relevant to emergency care were described in

² 274 9 of the 75 studies (12.0%).

Table 4. Unique access measures categorized by type and delays in care

Page 15 of 6	58	ВМЈ Ор	en	136/bmjopen	
1 _2	Availability N=40	Accessibility N=19	Accommodation N=42	copyri 2007 After abilition	Acceptability N=19
Seeking N=22	N=2	N=3	N=5	N=1 F N	N=11
4 5 6	Presence of community (lay) responders (62)	Patient access to a telephone (6, 11, 63)	Ability to get through on phone lines on first attempt (6)	Inability of misso work/secondanto cost (10)	Acceptability of EU care: by sex (21); by education level (23); age (23, 47); economic/financial status (53); social status (13); insurance (13); appearance (13); ethnicity (60); religion (60, 72), proximity to health facility (53)
7 8 9 10	Presence of dispatchers (68)	Presence of a national universal toll-free emergency number (6, 9, 10, 13, 14, 28, 43, 62, 71) Median time from onset of patient symptoms to contact with provider (13, 57)	Concerns over personal safety in seeking care (25) Patients and families responsible for arranging their transportation to the higher-level facility (14)	fo 1	Awareness of emergency care systems and services (5, 11, 52, 61) Community accepts and utilizes EMS care (62)
11 12 13 14 15 16 17 18			Presence of adequate child care (10) Required paperwork filled out before emergency care (13)	7 April 2023. Downloaded from Enseignement Superieur (Al r uses related to text and data	Fear of emergency dental treatment (47) Knowledge of emergency number (22, 27, 52, 57, 72) Knowledge of where the closest EU facility is located (52) Personally knew a healthcare provider (13, 60) Preference of traditional methods of care (e.g., bonesetters) over EU care (5, 8) Social and family disapproval (53) Understanding of how to navigate emergency care systems: general (6, 14, 23, 59) Understanding of what qualifies as an emergency condition/perception that condition is severe
Reaching N=46	N=9	N=13	N=12		enough to seek care (8, 17, 23, 52, 53, 72) N=4
20		Dispatcher training provided (6)	EMS delays: general (25); due to referrals (50)	= = =	Ambulances acceptable based on: language (63) if
20 21	Basic building (i.e., structural) resources specific and purpose built to emergency care (26)	Dispatcher training provided (6)	EMS delays: general (25); due to referrals (59)	Ambulange fee (27, 64)	Ambulances acceptable based on: language (63), if police involved/transport (63), slow response time (52)
22	EU radio/communication devices available for EMS handoff	Geography limits access: rural locations (1); mountainous	Existence of a coordinated emergency response	Ambulan ce fee By	Patient preference of ambulance care over other
23 24	(30) Fuel available for ambulances (14)	terrain (10) Calculated accessibility by 2SFCA method (24)	system (9, 28, 43, 71, 72) Equitable (plan for) distribution of ambulance stations (63)	ambular Ambular and referral fee (27)	forms of transport (52) Prehospital care acceptable to: those taking government ambulance (56), those taking taxis (56), road traffic accident victims (56), those being
25 26 27	Fuel for general (non-ambulance) transport (14) Presence of any healthcare facility (14)	Percent of patients who sought care or made it to a facility within 60 minutes of onset of symptoms (59) Response time from initial call to scene (3, 7, 14, 22, 35, 63, 70)	Facilities are notified in advance of patients arriving (15) General maintenance issues with vehicles (11)	Cost of transport (11, 14, 17, 19, 25, 47, 22) Paymen Qequired before treatmer 10 (34)	transferred for medico-legal reasons (56) Previous ambulance use and willingness to use ambulances in the future (63)
28 29 30 31	Presence and number of ambulances for interfacility transport (20) Presence and number of ambulances with basic life support capabilities (46) Presence and number of ambulances without medical capabilities/transport only (52)	Roadways limits access: traffic (1); poor or narrow roads (11, 14, 20, 52) System to access EC from trained first responders and the scene and urgent transport to a health facility (49) Transport time from a location to a facility with specific EU capabilities (i.e., PCI-capable hospital; trauma center, obstetric emergencies, tertiary hospital; 36, 45, 48, 55)	Number of separate modes of transportation (per patient) to reach care at facility (20) Patients taken to the police station before taking them to the hospital (13, 14) Percent of missed or prolonged pick-ups due to prehospital provider misunderstanding of location (6)	Preauth zatiooffee (64) Fees are quitable (64) Private withicle gansport fees (27	
32 33	Presence and number of helicopters for transport (68)	Transport time from home to hospital (2, 36, 46, 48, 51, 54) Transport time from scene to hospital (13, 29, 33, 35, 74)	Presence of drivers willing to respond to patient request (11)	1, 2025 Inologie	
34		Travel distance (5, 13, 14, 21, 20, 22, 27, 32, 51, 57, 59, 66,	Private ambulance services control rooms linked to cellular networks (68) Regulations governing EMS (43)	25 at gies.	
35 36		71, 72) Travel time from home to national ambulance service station (67)	System for care during transfer to a facility or between facilities that has the capability to	Agence	
37		Weather/Climate limits access: rainy season (11)	handle the case (20, 49)	nce	
Receiving N=69	N=29	N=3	N=24	N=8 B .	N=4
40	Absolute number of EU providers (stratified by type: physicians, nurses, and EMS providers; 6, 10, 13, 14, 17, 18,	Number of (trauma) fatalities within and outside the first hour (70)	Presence of disaster plan including, additional staffing for disasters (49, 68)	Absolute cost of C treatment (5, 1, 17, 21, 23,	Acceptable providers conduct and attitudes towards patients (13, 14, 57)
41	 Advanced cardiac life support or resuscitation equipment available in ambulances or number of ACLS ambulances (28, 	Fatality rate per patient kilometer from facility (70)	Availability of 24-hour ambulance care (no night hours, 52)	34, 47, 53, 71, 72) Copayment for Gare (65)	EC in line with patient's human rights (58)
42 43 44	30, 46, 56)			hique de	1.
45 46		For peer review only - http://bmjopen.bn	nj.com/site/about/guidelines.xhtm	nl <mark>e</mark>	

1		BMJ Op	ben	136/bmjopen-2 cted by copyr	Page 16 of 68
1 2	Availability of basic EU medications available (13, 15, 47, 50)	Able to access and receive care in last 12 months (61)	Availability of 24-hour emergency care (13, 26,	YT I	Providers/percent of providers deemed corrupt (13)
3	Availability of basic EU resources/equipment (9, 13, 14, 18,		57) Availability of 24-hour staff availability (20)	Cost of Gaility Reatment (19) Cost of medica	Sought care for wounds/trauma (5)
4 5	20, 26, 30, 50, 71, 72) Availability of EU infection control materials including soap		Care provided during transport (14)	investigations and radiography (1977) Cost of needicines (17, 23)	
6 7	(26, 77) Availability of EU procedures: Needle thoracostomy (15); chest tube (15); pelvic binding (15), defibrillation (15), cardioversion (15), pericardiocentesis (15); external cardiac		Care provided at lower-level facility before transfer (14)	Cost of treatment by a bonesetter (8)	
8 9 10	pacing (15); Blood transfusions (15, 32) Availability of EU specific supplies and equipment: 49, Suture and wound care supplies (15); Gloves (15); Oxygen (15, 45); Stethoscopes (20); Glucometer (15); Pulse oximetry; ECG		Legal protections for ambulance providers distributing and providing care (28)	Hospital costs beyond scope of alternet e.g.,	
11	machine (15); Resuscitation equipment (8) Availability of imaging (General: 17, Xray: 15, CT: 30, 68,		Miscommunication or mis-triage of patient acuity	Paymen	
12	ultrasound or MRI: 30) Availability of laboratory/diagnostic testing material (general		(6) Number of transfers per patient (6)	for imaging #423	
13	blood/urine tests: 17, 30, 32, 57; malaria smears: 32) Availability of potable (sterile) water (20, 73)		Number and Percent mis-triage (6)	Dov 1en: 1 to	
14	Availability of pre-hospital providers with standardized training		Percent of hospitals with out-of-hours clinician	proportion ancount of individuation of the second second payment of the second	
15	(9, 22, 28, 52, 56) Availability of sanitation (toilet, 73)		coverage (18) Physician comfort in adequately performing EU-	oad upe	
16	Availability of specified care: trauma care (4); orthopedic		specific procedures (30, 50) Presence of overcrowding (49)	nd	
17	(fracture) care (8, 15, 15); obstetrical emergencies (20); HIV care (20); cholera (20); tuberculosis care (20); general		· · · · · · · · · · · · · · · · · · ·	dat fro	
18	surgical services (20); dental care (20); critical care (20); entitledimensional care (20);			ta A r	
19 20	ophthalmological care (20) Electricity available (20, 26, 45)		Presence of a standardized EMR (13)		
20	Emergency equipment list available (20)		Protocols for patient transfers (20)	ing	
21 22	First aid received on scene by lay providers (i.e., members of the public, other motorists, or the less injured casualties; 34,		Protocols specific to trauma care (15)	, A	
22	49) First aid received on scene by trained providers (34)		Safe passage for health providers to the	from http://bmjopen.bmj.com/ ur (ABES) . data mining, Al training, and s	
24	Number of doctors staffing EU (appropriate for size; 68)		hospital at night (72) Staff comfort in treating EU conditions (32, 34)	aini <mark>en</mark> .	
25	Number of EU-specific area beds (20)		Training for community members and police:	ng ng	
26	Number of hospital-facility (non-EU specific) rooms or beds		First aid and triage (72) Training for providers: adult triage (18)	an <mark>j</mark>	
27	(10, 19, 57) Presence of EU with resuscitation bed/zone (49, 50)		Training for providers: EU-specific (13, 14, 27,	nd °	
28	Presence of EU (within facility; 2, 68)		46, 71) Training for providers: pediatric triage-specific	n/ on June 11, 2025 similar technologi	
29	Presence of EU dedicated nursing personnel (18)		(18) Time to lab tests (75); by patient GCS (75)	June lar tec	
30	Presence of facility burn unit (2) Presence of triage (13, 14, 49, 50)		Time to provider (e.g., wait time; 25, 75) Utilization and access to standardized clinical	ne	
31			care guidelines: general approach (15, 49);	11,	
32	Staff qualified to utilize EU equipment (26)		condition specific (sepsis, DKA, anemia, 15)	olo	
33	Staff qualified to treat EU conditions (27)				
34	Staff with EC training: ACLS or BLS training (30, 71, 72); ATLS, PALS (30, 72)			et at	
35	Staff with specialized training relevant to EC: 49, adult critical care (18); continuing education (18); EU equipment use (20);			Age	
36	neonatal care (50)			en	
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Unique measures of accessibility—the location of supply and the location of clients totaled 19 (13.9%), with a disproportionate number of measures studied more than once, leading to 66 total measurements (19.6%). The majority of the unique measures of accessibility corresponded to the process of reaching care (n=13, 68.4%) with most measures on the distance or time to a health service (n=11, 64.7%). Among the 13 studies reporting time, travel times to emergency care ranged from 5 minutes to 2 hours. The range of distances to health facilities demonstrated similar variability, though most (n=13) measurements were in kilometers. An additional study (n=1) reported on the percentage of the population living within a given distance or time, while other studies (n=4) reported on a range of distances or times to specific EU care (e.g., trauma, referral, cardiac). Other qualitative barriers to accessibility were also provided, including the effects of terrain, weather, and road quality.

Accommodation

Accommodation measures are those that assess the manner in which emergency care resources are organized to accept patients. Measures of accommodation made up the greatest number of unique measures (n=42, 30.7%), but they were rarely studied more than once (total n=62, 19.6%). Adequacy of child care, concerns over personal safety, and difficulties in getting through to prehospital providers were described as significant barriers in the process of seeking emergency care. The majority of unique measures on accommodation dealt with the process of receiving care (n=25, 59.5%). Among measures categorized as receiving care, facility-based measures (n=11, 44.0%) included measures of provider timeliness and availability, provider training.

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overcrowding, and protocols for care. Among the unique measures of accommodation, four (8.9%) described the use of standardized protocols (three related to prehospital care and one on facility-based care).

Affordability

Measures of affordability or assessing the cost of services relative to a patient or caregivers finances, were the least studied. While the 17 (12.4%) unique measures were similar to the numbers for accessibility and acceptance, measures were rarely studied more than once (n=34, 10.1%). Of the unique metrics reported, most reported on different aspects of the cost of transportation in reaching care (n=8, 47.1%) and the cost of receiving treatment (n=5, 29.4%). Types of costs varied, including cost of an ambulance ride, cost of deposit before treatment, and total hospital bills. A single study described the lack of emergency care affordability based on lost wages from missing work.

Acceptability

Acceptability measures uncovered how well patient's attitudes around emergency care matched those of providers or systems. Seventeen (12.4%) unique measures of acceptability were described in the literature. The majority were related to the process of care seeking (n=11, 64.7%). Measures largely described patient's understanding, acceptability, willingness, and fears in activating and navigating emergency care systems.

Awareness

Lastly, some have argued for inclusion of awareness as a 6th category of access. There were 5 unique measures of awareness, which largely overlapped with the previous 5 other categories, most specifically acceptability. These five measures were reported a total of 18 times.

Access measures by frameworks of emergency care

Individual metrics were also mapped to the Three Delay model, and categorized as either, seeking, reaching, or receiving care (Table 4). Unique measures of seeking care (N=22, 16.1%) largely dealt with pre-facility care and included individual thought processes, the socio-cultural forces underlying care seeking behavior, or systematic structural barriers to seeking care. Measures of reaching emergency care (N=46, 33.6%) largely measured the adequacy of out of hospital care, including the presence, number and proportion of ambulances to population, the time from community to care, the cost of ambulance services, and distribution and systems of ambulance-based care. The majority of unique access measures described the processes of receiving care (n=69, 50.4%). Most measures dealt with the availability of facility-based care services.

Measures were also mapped to the WHO emergency care systems framework (**Table 5**). The WHO Framework 'captures essential emergency care functions at the scene of injury or illness, during transport, and through to emergency unit and early inpatient care'. (16) Roughly equal proportions of measures were focused on prehospital care—inclusive of care at the scene and during transport to a facility (n=76, 55.4%) and facility-based emergency care (n=57, 41.6%). However, given the largely linear nature of the framework, a total of 4 (2.9%) unique measures could not be defined by this framework and were neither specific to prehospital nor facility-based care. The

majority of out of hospital care measures focused on the trans	sfer process (n=45 of 76,
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59.2%), while most facility-based measures dealt with EU-based care (n=51 of 57,

89.5%). None of the included manuscripts measured EU disposition or elements of

early inpatient care.

Table 5. Unique number of access measures as defined by the WHO Emergency Care Systems Framework. by access type.

15	Systems Frame	WOIK. Dy acce	ss type.				ç	
16	WHO ECSF	Total*			Access Type			Ś
17 18 10	Site Primary Function	N=133 (%)	Availability N=39 (%)	Accessibility N=18 (%)	Accommodation N=42 (%)	Affordability N=17 (%)	Acceptability N=19 (%)	inht in
19 20	Out of hospital care	76 (57.1)	11 (28.2)	17 (94.4)	25 (59.5)	9 (52.9)	14 (73.7)	5
21	Bystander Response	17 (12.8)	1 (2.6)	3 (16.7)	3 (7.1)	1 (5.9)	9 (47.4)	din (
22 23 24 25	EMS Dispatch Provider Response Transfer	3 (2.3) 11 (8.2) 45 (33.8)	1 (2.6) 2 (5.1) 7 (17.9)	1 (5.6) 2 (11.1) 11 (61.1)	1 (2.4) 6 (14.3) 15 (35.7)	8 (47.1)	1 (5.3) 4 (21.1)	Éns Éns
26	Facility-based care	57 (42.9)	28 (71.8)	1 (5.6)	17 (40.5)	8 (47.1)	3 (15.8)	eigne
27 28	Reception and Triage	6 (4.5)	2 (5.1)		4 (9.5)			and t
20 29 30	EU Care Disposition	51 (38.3)	26 (66.7)	1 (5.6)	13 (31.0)	8 (47.1)		nt Sup
31	Inpatient Care							and

*Total is out of 133, as 4 measures could not be defined by ECSF

Discussion

Increased global access to quality emergency care has the potential to reduce mortality associated with non-communicable illness and trauma as well as infectious disease and pregnancy related complications.(9-12) Analyzing emergency care access measures in detail has the potential to elucidate gaps in health systems—made worse by the Covid-19 pandemic—that can guide strategies to address existing inequities in care. To date, this is the first review of access measures specific to emergency care in LMICs.

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This review revealed several common themes. The majority of unique emergency care access measures focus on availability and accommodation, but total measures of accessibility appear to be more frequently described in the literature. This has led to the disproportionate emphasis on distance and time to a health facility as demonstrative of emergency care access. In reality, upon arrival to a health facility with an emergency condition, most patients are met with limited, ineffective, or non-existent emergency care provision.

Relative to other categories of access reviewed, measures of affordability were the least studied in the literature. These measures often lacked information to contextualize data relative to the gross domestic product of the study population's cost of living. Cost is known to play a significant role in patient's overall healthcare access in all health systems, not just LMICs. (33) Costs associated with emergency health services are known to vary widely across health systems regardless of a country's GDP.(34, 35) Moreover, cost-effectiveness is a widely used method to inform resource allocation, yet evidence to better understand health inequity in all its forms, should include additional efforts to study the cost-effectiveness of emergency care interventions and emergency care systems in LMICs. Measures of access included in this study included both direct (user fees, medication costs, laboratory and imaging tests) and indirect (lost wages, travel costs). Further consensus led efforts to determine measures most important for system comparison are necessary.

In 2018 the World Health Assembly passed resolution 72.16. ensuring the role of emergency care in all health systems. (16) The WHO Emergency Care System Framework sought to provide further context to health policy makers on the role of

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> emergency care systems in ensuring universal health coverage. (16) While prehospital and facility-based measures of access were equally represented on the literature, though significant gaps remained in both domains. Among prehospital care, most measures focused on the transfer process, with less focus on dispatch and provider response. Several areas of this framework had no associated measures described in the literature.

According to the ECSF considerably few studies described measures related to the EU reception process (e.g., registration, screening, and triage) or the transfer of care between prehospital and facility-based providers. Additionally, no measures described the process of EU disposition or transfer of care to the inpatient ward. Though disposition, transfer, referrals, and transition of care from one provider to another are often cited as times of higher risk to patients, measures of this risk were not adequately described in this study.(36) Several WHO initiatives have sought to strengthen EU quality globally. Future efforts should seek to define and refine a core set of measures specific to emergency care access to aid in the monitoring and evaluation of those efforts. The further validation of a core set of measures with minimum standards across low, middle, and high-income contexts can help to further increase access to high quality emergency care and the expansion of universal health coverage.

Limitations

This study makes an initial attempt to describe measures of access to emergency care, but it is restricted in scope and possesses several limitations. First, this study is limited to English language articles only and may does not include articles in other languages widely spoken in many LMICs, including French, Portuguese and

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Arabic. Second, while a gray literature review was conducted, we are likely missing measures in use by health facilities, global health organizations, and health ministries. Further attempts at key informant interviews or focus groups with those in LMICs. undoubtably would uncover other measures, but was beyond the scope of this review. Third, given the limitations in study data there was no attempt made to rank-order measures based on feasibility, nor the degree to which they correspond to specific patient outcomes. We recognize that not all measures have equal utility, with some better reflecting access to care issues and serving as more significant correlates of patient outcome. Fourth, though the actual corresponding outcome measures were collected (and described in Supplementary Material, eTable 2), given the heterogeneity of measures and limitations of the search strategy we were unable to provide reference (or minimum) standards for the access measures described. Future efforts hope to describe further the actual measurements. Other fields have attempted, at times with similar difficulty, to establish reference standards (e.g., the Lancet Commission on Global Surgery has recommended a maximum two-hour travel time to surgical services, while similar measures of time to surgery remain controversial (37, 38). However, very few consensus derived standards exist for measuring access to emergency care. (39) This lack of consensus makes further facility, regional, and national comparisons difficult and limits effective understanding of care. Similar to previous consensus work on measures of emergency care quality in LMICs, future efforts should aim to define a core list of indicators of access to emergency care. (19) Lastly, risk of bias assessment was not performed given the descriptive nature of most studies. Other methodologic and search strategy sought to limit bias in the initial selection of articles.

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Conclusions

Increasing access to quality emergency care is a key step in strengthening heath systems in LMICs. This scoping review demonstrates that while existing literature examines a wide breadth of access metrics, many gaps remain in our understanding of emergency care access in LMICs. As researchers continue to examine access and barriers to emergency care, special attention should be paid to those dimensions of access less commonly examined, such as affordability. Standardized, consensus-based measures of emergency care access in line with the ECSF should be developed to allow for more universal comparisons of healthcare functions.

Author Contributions

CB, ECH, and SH contributed to the conception and design of the work. SH and JD contributed to data collection and review. SH and CB contributed to data analysis and interpretation and drafting of the article. MB, MR, and ECH contributed to critical revisions of the article. All named authors have approved of the version to be published and agreed to be accountable for all aspects of the work.

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Ethics: As a scoping review, this manuscript does not involve human subjects and is exempt from ethics review based on the corresponding author's IRB.

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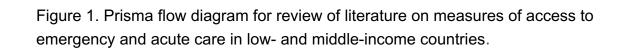
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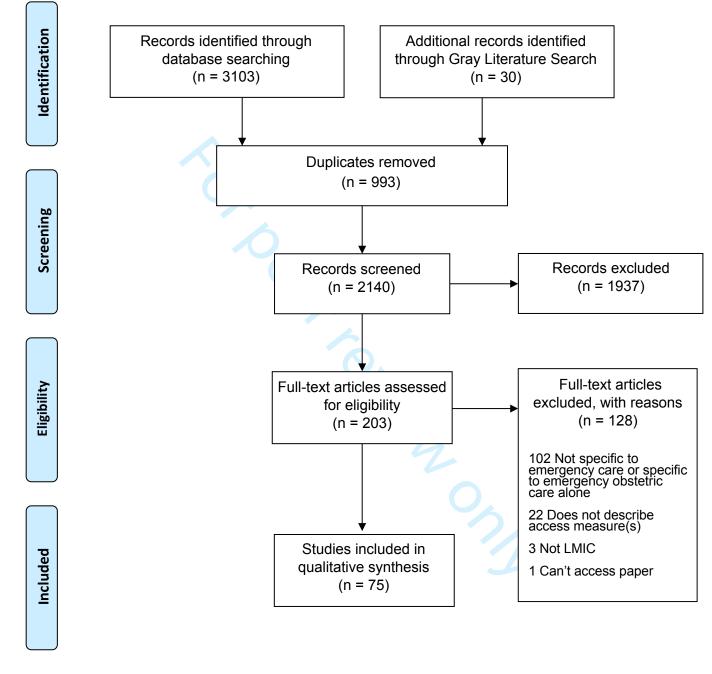
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Appendix 1

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56 57 Search Strategy: PUBMED

Initial Search: Feb 4 2020; Follow up search date: 11/22/2020; Second Follow up search date: 11/30/2020, revised for CINAHL performed on 11/20/2022

Emergency med terms

"emergency responder"[tw] OR "emergency responders"[tw] OR "emergency doctor"[tw] OR "emergency doctors"[tw] OR "emergency clinician"[tw] OR "emergency clinicians"[tw] OR "emergency physician"[tw] OR "emergency physicians"[tw] OR "emergency personnel"[tw] OR "emergency medical personnel" [tw] OR "emergency service" [tw] OR "emergency services"[tw] OR "emergency medical service"[tw] OR "emergency medical services"[tw] OR "emergency medicine"[tw] OR "emergency health service"[tw] OR "emergency health services"[tw] OR "emergency care"[tw] OR "emergency healthcare"[tw] OR "emergency treatment"[tw] OR "emergency treatments"[tw] OR "emergency department"[tw] OR "emergency departments"[tw] OR "emergency room"[tw] OR "emergency rooms"[tw] OR "emergency ward"[tw] OR "emergency wards"[tw] OR "emergency unit"[tw] OR "emergency units"[tw] OR "emergency hospital"[tw] OR "emergency hospitals"[tw] OR "emergency clinic"[tw] OR "emergency clinics"[tw] OR "emergency setting"[tw] OR "emergency staff"[tw] OR "emergency response" [tw] OR "emergency medical technician" [tw] OR "emergency medical technicians"[tw] OR "paramedic"[tw] OR "paramedics"[tw] OR "ambulance"[tw] OR "ambulances"[tw] OR "ER"[tw] OR "first responder"[tw] OR "first responders"[tw] OR "rescue work"[tw] OR "rescue worker"[tw] OR "rescue workers"[tw] OR "relief work"[tw] OR "relief worker"[tw] OR "relief workers"[tw] OR "firefighter"[tw] OR "firefighters"[tw] OR "fire fighter"[tw] OR "fire fighters" [tw] OR "trauma center" [tw] OR "trauma centers" [tw] OR "trauma unit" [tw] OR "trauma units"[tw] OR "critical care"[tw] OR "critical illness"[tw] OR "critical illnesses"[tw] OR "resuscitation"[tw] OR "shock"[tw] OR "sepsis"[tw] OR "septicemia"[tw] OR "septicaemia"[tw] OR "acute care"[tw] OR "acute disease"[tw] OR "acute diseases"[tw] OR "prehospital"[tw] OR "pre hospital"[tw] OR "wound"[tw] OR "wounds"[tw] OR "triage"[tw] OR "pregnancy complication"[tw] OR "pregnancy complications"[tw] OR "obstetric complication"[tw] OR "obstetric complications"[tw] OR "obstetric emergency"[tw] OR "obstetric emergencies"[tw]

AND

"Access"[tw]) AND ("availability" OR "availabl*" OR "affordab*" OR "cost" OR "distance" OR "spatial" OR "barrier" OR "barriers" OR "quality") AND

LMIC: based on Cochrane Foundation PubMed Filter

("developing country"[tw] OR "developing countries"[tw] OR "developing nation"[tw] OR "developing nations"[tw] OR "developing population"[tw] OR "developing populations"[tw] OR "developing world"[tw] OR "less developed country"[tw] OR "less developed countries"[tw] OR "less developed nation"[tw] OR "less developed nations"[tw] OR "less developed population"[tw] OR "less developed populations"[tw] OR "less developed world"[tw] OR "lesser developed country"[tw] OR "lesser developed countries"[tw] OR "lesser developed nations"[tw] OR "lesser developed countries"[tw] OR "lesser developed populations"[tw] OR "lesser developed population"[tw] OR "lesser developed populations"[tw] OR "lesser developed world"[tw] OR "lesser developed populations"[tw] OR "lesser developed world"[tw] OR "lesser developed populations"[tw] OR "lesser developed nation"[tw] OR "least developed populations"[tw] OR "lesser developed nation"[tw] OR "least developed populations"[tw] OR "lesser developed nation"[tw] OR "least developed nations"[tw] OR "least developed population"[tw] OR "least developed nations"[tw] OR "least developed population"[tw] OR "least developed nations"[tw] OR "least developed population"[tw] OR "least developed populations"[tw] OR "least developed nation"[tw] OR "under developed country"[tw] OR "under developed nation"[tw] OR "under developed nations"[tw] OR "under developed nation"[tw] OR "under developed nations"[tw] OR "under developed population"[tw] OR "under developed nations"[tw] OR "under developed population"[tw] OR "under developed nations"[tw] OR "under developed population"[tw] OR "under developed population"[tw]

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OR "under developed populations" [tw] OR "under developed world" [tw] OR "underdeveloped country"[tw] OR "underdeveloped countries"[tw] OR "underdeveloped nation"[tw] OR "underdeveloped nations"[tw] OR "underdeveloped population"[tw] OR "underdeveloped 6 populations"[tw] OR "underdeveloped world"[tw] OR "middle income country"[tw] OR "middle income countries"[tw] OR "middle income nation"[tw] OR "middle income nations"[tw] OR 8 "middle income population"[tw] OR "middle income populations"[tw] OR "low income 9 country"[tw] OR "low income countries"[tw] OR "low income nation"[tw] OR "low income 10 nations"[tw] OR "low income population"[tw] OR "low income populations"[tw] OR "lower income 11 country"[tw] OR "lower income countries"[tw] OR "lower income nation"[tw] OR "lower income 12 nations"[tw] OR "lower income population"[tw] OR "lower income populations"[tw] OR 13 "underserved country"[tw] OR "underserved countries"[tw] OR "underserved nation"[tw] OR 14 "underserved nations"[tw] OR "underserved population"[tw] OR "underserved populations"[tw] 15 OR "underserved world"[tw] OR "under served country"[tw] OR "under served countries"[tw] OR 16 "under served nation"[tw] OR "under served nations"[tw] OR "under served population"[tw] OR 17 "under served populations"[tw] OR "under served world"[tw] OR "deprived countrv"[tw] OR 18 19 "deprived countries"[tw] OR "deprived nation"[tw] OR "deprived nations"[tw] OR "deprived 20 population"[tw] OR "deprived populations"[tw] OR "deprived world"[tw] OR "poor country"[tw] 21 OR "poor countries"[tw] OR "poor nation"[tw] OR "poor nations"[tw] OR "poor population"[tw] OR 22 "poor populations"[tw] OR "poor world"[tw] OR "poorer country"[tw] OR "poorer countries"[tw] 23 OR "poorer nation"[tw] OR "poorer nations"[tw] OR "poorer population"[tw] OR "poorer 24 populations"[tw] OR "poorer world"[tw] OR "developing economy"[tw] OR "developing 25 economies"[tw] OR "less developed economy"[tw] OR "less developed economies"[tw] OR 26 "lesser developed economy"[tw] OR "lesser developed economies"[tw] OR "under developed 27 economy"[tw] OR "under developed economies"[tw] OR "underdeveloped economy"[tw] OR 28 "underdeveloped economies" [tw] OR "middle income economy" [tw] OR "middle income 29 economies"[tw] OR "low income economy"[tw] OR "low income economies"[tw] OR "lower 30 income economy"[tw] OR "lower income economies"[tw] OR "low gdp"[tw] OR "low gnp"[tw] OR 31 "low gross domestic"[tw] OR "low gross national"[tw] OR "lower gdp"[tw] OR "lower gnp"[tw] OR 32 "lower gross domestic"[tw] OR "lower gross national"[tw] OR Imic[tw] OR Imics[tw] OR "third 33 world"[tw] OR "lami country"[tw] OR "lami countries"[tw] OR "transitional country"[tw] OR 34 "transitional countries"[tw] OR Africa[tw] OR Asia[tw] OR Caribbean[tw] OR West Indies[tw] OR 35 South America[tw] OR Latin America[tw] OR Central America[tw] OR Afghanistan[tw] OR 36 37 Albania[tw] OR Algeria[tw] OR Angola[tw] OR Antigua[tw] OR Barbuda[tw] OR Argentina[tw] OR Armenia[tw] OR Armenian[tw] OR Aruba[tw] OR Azerbaijan[tw] OR Bahrain[tw] OR 38 39 Bangladesh[tw] OR Barbados[tw] OR Benin[tw] OR Byelarus[tw] OR Byelorussian[tw] OR 40 Belarus[tw] OR Belorussian[tw] OR Belorussia[tw] OR Belize[tw] OR Bhutan[tw] OR Bolivia[tw] 41 OR Bosnia[tw] OR Herzegovina[tw] OR Hercegovina[tw] OR Botswana[tw] OR Brasil[tw] OR 42 Brazil[tw] OR Bulgaria[tw] OR Burkina Faso[tw] OR Burkina Fasso[tw] OR Upper Volta[tw] OR 43 Burundi[tw] OR Urundi[tw] OR Cambodia[tw] OR Khmer Republic[tw] OR Kampuchea[tw] OR 44 Cameroon[tw] OR Cameroons[tw] OR Cameron[tw] OR Camerons[tw] OR Cape Verde[tw] OR 45 Central African Republic[tw] OR Chad[tw] OR Chile[tw] OR China[tw] OR Colombia[tw] OR 46 Comoros[tw] OR Comoro Islands[tw] OR Comores[tw] OR Mayotte[tw] OR Congo[tw] OR 47 Zaire[tw] OR Costa Rica[tw] OR Cote d'Ivoire[tw] OR Ivory Coast[tw] OR Croatia[tw] OR 48 Cuba[tw] OR Cyprus[tw] OR Czechoslovakia[tw] OR Czech Republic[tw] OR Slovakia[tw] OR 49 Slovak Republic[tw] OR Dibouti[tw] OR French Somaliland[tw] OR Dominica[tw] OR Dominican 50 Republic[tw] OR East Timor[tw] OR East Timur[tw] OR Timor Leste[tw] OR Ecuador[tw] OR 51 Egypt[tw] OR United Arab Republic[tw] OR El Salvador[tw] OR Eritrea[tw] OR Estonia[tw] OR 52 Ethiopia[tw] OR Fiji[tw] OR Gabon[tw] OR Gabonese Republic[tw] OR Gambia[tw] OR Gaza[tw] 53 OR Georgia Republic[tw] OR Georgian Republic[tw] OR Ghana[tw] OR Gold Coast[tw] OR 54 Greece[tw] OR Grenada[tw] OR Guatemala[tw] OR Guinea[tw] OR Guam[tw] OR Guiana[tw] 55 OR Guyana[tw] OR Haiti[tw] OR Honduras[tw] OR Hungary[tw] OR India[tw] OR Maldives[tw] 56 57 58

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OR Indonesia[tw] OR Iran[tw] OR Iran[tw] OR Isle of Man[tw] OR Jamaica[tw] OR Jordan[tw] OR Kazakhstan[tw] OR Kazakh[tw] OR Kenya[tw] OR Kiribati[tw] OR Korea[tw] OR Kosovo[tw] OR Kyrgyzstan[tw] OR Kirghizia[tw] OR Kyrgyz Republic[tw] OR Kirghiz[tw] OR Kirgizstan[tw] OR "Lao PDR"[tw] OR Laos[tw] OR Latvia[tw] OR Lebanon[tw] OR Lesotho[tw] OR Basutoland[tw] OR Liberia[tw] OR Libva[tw] OR Lithuania[tw] OR Macedonia[tw] OR Madagascar[tw] OR Malagasy Republic[tw] OR Malaysia[tw] OR Malaya[tw] OR Malay[tw] OR Sabah[tw] OR Sarawak[tw] OR Malawi[tw] OR Nyasaland[tw] OR Mali[tw] OR Malta[tw] OR Marshall Islands[tw] OR Mauritania[tw] OR Mauritius[tw] OR Agalega Islands[tw] OR Mexico[tw] OR Micronesia[tw] OR Middle East[tw] OR Moldova[tw] OR Moldovia[tw] OR Moldovian[tw] OR Mongolia[tw] OR Montenegro[tw] OR Morocco[tw] OR Ifni[tw] OR Mozambique[tw] OR Myanmar[tw] OR Myanma[tw] OR Burma[tw] OR Namibia[tw] OR Nepal[tw] OR Netherlands Antilles[tw] OR New Caledonia[tw] OR Nicaragua[tw] OR Niger[tw] OR Nigeria[tw] OR Northern Mariana Islands[tw] OR Oman[tw] OR Muscat[tw] OR Pakistan[tw] OR Palau[tw] OR Palestine[tw] OR Panama[tw] OR Paraguay[tw] OR Peru[tw] OR Philippines[tw] OR Philipines[tw] OR Phillipines[tw] OR Phillippines[tw] OR Poland[tw] OR Portugal[tw] OR Puerto Rico[tw] OR Rhodesia[tw] OR Romania[tw] OR Rumania[tw] OR Roumania[tw] OR Russia[tw] OR Russian[tw] OR Rwanda[tw] OR Ruanda[tw] OR Saint Kitts[tw] OR St Kitts[tw] OR Nevis[tw] OR Saint Lucia[tw] OR St Lucia[tw] OR Saint Vincent[tw] OR St Vincent[tw] OR Grenadines[tw] OR Samoa[tw] OR Samoan Islands[tw] OR Navigator Island[tw] OR Navigator Islands[tw] OR Sao Tome[tw] OR Saudi Arabia[tw] OR Senegal[tw] OR Serbia[tw] OR Montenegro[tw] OR Seychelles[tw] OR Sierra Leone[tw] OR Slovenia[tw] OR Sri Lanka[tw] OR Ceylon[tw] OR Solomon Islands[tw] OR Somalia[tw] OR Sudan[tw] OR Suriname[tw] OR Surinam[tw] OR Swaziland[tw] OR Syria[tw] OR Tajikistan[tw] OR Tadzhikistan[tw] OR Tadjikistan[tw] OR Tadzhik[tw] OR Tanzania[tw] OR Thailand[tw] OR Togo[tw] OR Togolese Republic[tw] OR Tonga[tw] OR Trinidad[tw] OR Tobago[tw] OR Tunisia[tw] OR Turkev[tw] OR Turkmenistan[tw] OR Turkmen[tw] OR Uganda[tw] OR Ukraine[tw] OR Uruguay[tw] OR USSR[tw] OR Soviet Union[tw] OR Union of Soviet Socialist Republics[tw] OR Uzbekistan[tw] OR Uzbek OR Vanuatu[tw] OR New Hebrides[tw] OR Venezuela[tw] OR Vietnam[tw] OR Viet Nam[tw] OR West Bank[tw] OR Yemen[tw] OR Yugoslavia[tw] OR Zambia[tw] OR Zimbabwe[tw] OR Pacific region OR Pacific island)

OVID, Global Health (CABI): Used Identical terms as Embase

Embase: Date of Search: Feb 6 2020

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Access terms ('emergency responder' OR 'emergency responders' OR 'emergency doctor' OR 'emergency doctors' OR 'emergency clinician' OR 'emergency clinicians' OR 'emergency physician' OR 'emergency physicians' OR 'emergency personnel' OR 'emergency medical personnel' OR 'emergency service' OR 'emergency services' OR 'emergency medical service' OR 'emergency medical services' OR 'emergency medicine' OR 'emergency health service' OR 'emergency health services' OR 'emergency care' OR 'emergency healthcare' OR 10 'emergency treatment' OR 'emergency treatments' OR 'emergency department' OR 11 'emergency departments' OR 'emergency room' OR 'emergency rooms' OR 'emergency 12 ward' OR 'emergency wards' OR 'emergency unit' OR 'emergency units' OR 'emergency 13 hospital' OR 'emergency hospitals' OR 'emergency clinic' OR 'emergency clinics' OR 14 'emergency setting' OR 'emergency staff' OR 'emergency response' OR 'emergency medical 15 technician' OR 'emergency medical technicians' OR 'paramedic' OR 'paramedics' OR 16 17 'ambulance' OR 'ambulances' OR 'ER' OR 'first responder' OR 'first responders' OR 'rescue work' OR 'rescue worker' OR 'rescue workers' OR 'relief work' OR 'relief worker' OR 'relief 18 19 workers' OR 'firefighter' OR 'firefighters' OR 'fire fighter' OR 'fire fighters' OR 'trauma center' 20 OR 'trauma centers' OR 'trauma unit' OR 'trauma units' OR 'critical care' OR 'critical illness' 21 OR 'critical illnesses' OR 'resuscitation' OR 'shock' OR 'sepsis' OR 'septicemia' OR 22 'septicaemia' OR 'acute care' OR 'acute disease' OR 'acute diseases' OR 'prehospital' OR 23 'pre hospital' OR 'wound' OR 'wounds' OR 'triage' OR 'pregnancy complication' OR 24 'pregnancy complications' OR 'obstetric complication' OR 'obstetric complications' OR 25 'obstetric emergency' OR 'obstetric emergencies') 26 AND 'Access' AND ('availability' OR 'availabl*' OR 'affordab*' OR 'cost' OR 'distance' OR 27 'spatial' OR 'barrier' OR 'barriers' OR 'quality') AND ('emergency responder' OR 'emergency 28 responders' OR 'emergency doctor' OR 'emergency doctors' OR 'emergency clinician' OR 29 'emergency clinicians' OR 'emergency physician' OR 'emergency physicians' OR 'emergency 30 personnel' OR 'emergency medical personnel' OR 'emergency service' OR 'emergency 31 services' OR 'emergency medical service' OR 'emergency medical services' OR 'emergency 32 medicine' OR 'emergency health service' OR 'emergency health services' OR 'emergency care' 33 OR 'emergency healthcare' OR 'emergency treatment' OR 'emergency treatments' OR 34 'emergency department' OR 'emergency departments' OR 'emergency room' OR 'emergency 35 rooms' OR 'emergency ward' OR 'emergency wards' OR 'emergency unit' OR 'emergency units' 36 37 OR 'emergency hospital' OR 'emergency hospitals' OR 'emergency clinic' OR 'emergency 38 clinics' OR 'emergency setting' OR 'emergency staff' OR 'emergency response' OR 'emergency 39 medical technician' OR 'emergency medical technicians' OR 'paramedic' OR 'paramedics' OR 40 'ambulance' OR 'ambulances' OR 'ER' OR 'first responder' OR 'first responders' OR 'rescue 41 work' OR 'rescue worker' OR 'rescue workers' OR 'relief work' OR 'relief worker' OR 'relief 42 workers' OR 'firefighter' OR 'firefighters' OR 'fire fighter' OR 'fire fighters' OR 'trauma center' OR 43 'trauma centers' OR 'trauma unit' OR 'trauma units' OR 'critical care' OR 'critical illness' OR 44 'critical illnesses' OR 'resuscitation' OR 'shock' OR 'sepsis' OR 'septicemia' OR 'septicaemia' 45 OR 'acute care' OR 'acute disease' OR 'acute diseases' OR 'prehospital' OR 'pre hospital' OR 46 'wound' OR 'wounds' OR 'triage' OR 'pregnancy complication' OR 'pregnancy complications' 47 OR 'obstetric complication' OR 'obstetric complications' OR 'obstetric emergency' OR 'obstetric 48 emergencies') AND ('developing country' OR 'middle income country' OR 'middle income 49 countr*' OR 'low income country' OR 'global medicine' OR 'third world' OR 'underserved countr*' 50 OR 'resource limited country' OR 'Imic*' OR 'low income economy' OR 'middle income economy' 51 OR 'underdeveloped countr*' OR 'underdeveloped economy' OR 'poor countr*' OR 'poor nation' 52 OR 'world health' OR 'middle-income countr*' OR 'transitional countr*' OR 'lower middle income 53 countr*' OR 'upper middle income' OR 'less developed countr*' OR 'lesser developed countr*' 54 OR 'developing countr*' OR 'developing nation' OR 'lower-middle income countr*' OR 'upper-55 middle income countr*' OR 'low-income countr*' OR 'deprived countr*' OR 'low gdp' OR 'lami 56 57 58

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countr*' OR 'poorer nation' OR 'under served countr*' OR 'under served nation' OR 'lower income population' OR 'low income population' OR 'developing world' OR 'africa' OR 'asia' OR 'caribbean' OR armenian OR aruba OR byelorussian OR belarus OR belorussian OR belorussia OR bosnia OR herzegovina OR hercegovina OR brasil OR 'comoro islands' OR comores OR mayotte OR zaire OR 'ivory coast' OR 'slovak republic' OR 'french somaliland' OR 'east timur' OR 'timor leste' OR 'united arab republic' OR 'gabonese republic' OR gaza OR 'georgia republic' OR 'georgian republic' OR 'gold coast' OR guiana OR maldives OR 'isle of man' OR kazakh OR kiribati OR kirghizia OR 'kyrgyz republic' OR kirghiz OR kirgizstan OR basutoland OR 'malagasy republic' OR malaya OR malay OR sabah OR sarawak OR nyasaland OR 'marshall islands' OR 'agalega islands' OR moldovia OR moldovian OR ifni OR myanma OR burma OR 'northern mariana islands' OR muscat OR palestine OR philipines OR philipines OR philippines OR rumania OR roumania OR russian OR ruanda OR 'saint kitts' OR 'st kitts' OR nevis OR 'st lucia' OR 'st vincent' OR 'samoan islands' OR 'navigator island' OR 'navigator islands' OR 'sao tome' OR ceylon OR 'solomon islands' OR surinam OR tadzhikistan OR tadjikistan OR tadzhik OR 'togolese republic' OR turkmen OR 'soviet union' OR 'union of soviet socialist republics' OR uzbek OR 'new hebrides' OR 'viet nam' OR 'west bank' OR rhodesia OR africa OR 'africa, northern' OR 'africa south of the sahara' OR 'africa, central' OR 'africa, eastern or africa, southern' OR 'africa, western or asia' OR 'asia, central' OR 'asia, southeastern' OR 'asia, western' OR 'caribbean region' OR 'west indies' OR 'south america' OR 'latin america' OR 'central america' OR afghanistan OR albania OR algeria OR 'american samoa' OR angola OR antigua OR barbuda OR argentina OR armenia OR azerbaijan OR bahrain OR bangladesh OR barbados OR benin OR byelarus OR belize OR bhutan OR bolivia OR 'bosnia-herzegovina' OR botswana OR brazil OR bulgaria OR 'cape verde' OR 'central african republic' OR chad OR chile OR china OR colombia OR comoros OR congo OR 'costa rica' OR 'cote d ivoire' OR croatia OR cuba OR cvprus OR czechoslovakia OR 'czech republic' OR slovakia OR diibouti OR 'democratic republic of the congo' OR dominica OR 'dominican republic' OR 'east timor' OR ecuador OR egypt OR 'el salvador' OR eritrea OR estonia OR ethiopia OR fiji OR gabon OR gambia OR georgia OR ghana OR greece OR grenada OR guatemala OR guinea OR 'guineabissau' OR guam OR guyana OR haiti OR honduras OR hungary OR india OR indonesia OR iran OR irag OR jamaica OR jordan OR kazakhstan OR kenya OR korea OR kosovo OR kyrgyzstan OR laos OR latvia OR lebanon OR lesotho OR liberia OR libya OR lithuania OR macedonia OR madagascar OR malaysia OR malawi OR mali OR malta OR mauritania OR mauritius OR mexico OR micronesia OR 'middle east' OR moldova OR mongolia OR morocco OR mozambigue OR myanmar OR namibia OR nepal OR 'netherlands antilles' OR 'new caledonia' OR nicaragua OR niger OR nigeria OR oman OR pakistan OR palau OR panama OR 'papua new guinea' OR paraguay OR peru OR philippines OR poland OR portugal OR 'puerto rico' OR romania OR russia OR rwanda OR 'saint lucia' OR 'saint vincent' OR grenadines OR samoa OR 'saudi arabia' OR senegal OR serbia OR montenegro OR seychelles OR 'sierra leone' OR slovenia OR 'sri lanka' OR somalia OR 'south africa' OR sudan OR suriname OR swaziland OR syria OR tajikistan OR tanzania OR thailand OR togo OR tonga OR trinidad OR tobago OR tunisia OR turkey OR turkmenistan OR uganda OR ukraine OR uruguay OR ussr OR uzbekistan OR vanuatu OR venezuela OR vietnam OR yemen OR yugoslavia OR zambia OR zimbabwe OR 'burkina faso' OR 'upper volta' OR burundi OR urundi OR cambodia OR 'khmer republic' OR kampuchea OR cameroon OR cameroons OR 'cameron or' AND camerons OR 'cape verde' OR 'central african republic' OR 'pacific region' OR 'pacific island'

'access' AND ('availability' OR 'availabl*' OR 'affordab*' OR 'cost' OR 'distance' OR 'spatial' OR 'barrier' OR 'barriers' OR 'quality') AND ('emergency responder' OR 'emergency responders' OR 'emergency doctor' OR 'emergency doctors' OR 'emergency clinician' OR 'emergency clinicians' OR 'emergency physician' OR 'emergency physicians' OR 'emergency personnel' OR 'emergency medical personnel' OR 'emergency service' OR 'emergency services' OR

'emergency medical service' OR 'emergency medical services' OR 'emergency medicine' OR 'emergency health service' OR 'emergency health services' OR 'emergency care' OR 'emergency healthcare' OR 'emergency treatment' OR 'emergency treatments' OR 'emergency 6 department' OR 'emergency departments' OR 'emergency room' OR 'emergency rooms' OR 'emergency ward' OR 'emergency wards' OR 'emergency unit' OR 'emergency units' OR 'emergency hospital' OR 'emergency hospitals' OR 'emergency clinic' OR 'emergency clinics' 9 OR 'emergency setting' OR 'emergency staff' OR 'emergency response' OR 'emergency 10 medical technician' OR 'emergency medical technicians' OR 'paramedic' OR 'paramedics' OR 11 'ambulance' OR 'ambulances' OR 'er' OR 'first responder' OR 'first responders' OR 'rescue work' 12 OR 'rescue worker' OR 'rescue workers' OR 'relief work' OR 'relief worker' OR 'relief workers' 13 OR 'firefighter' OR 'firefighters' OR 'fire fighter' OR 'fire fighters' OR 'trauma center' OR 'trauma 14 centers' OR 'trauma unit' OR 'trauma units' OR 'critical care' OR 'critical illness' OR 'critical 15 illnesses' OR 'resuscitation' OR 'shock' OR 'sepsis' OR 'septicemia' OR 'septicaemia' OR 'acute 16 17 care' OR 'acute disease' OR 'acute diseases' OR 'prehospital' OR 'pre hospital' OR 'wound' OR 'wounds' OR 'triage' OR 'pregnancy complication' OR 'pregnancy complications' OR 'obstetric 18 19 complication' OR 'obstetric complications' OR 'obstetric emergency' OR 'obstetric emergencies') 20 AND (('developing country' OR 'middle income country' OR 'middle income countr*' OR 'low 21 income country' OR 'global medicine' OR 'third world' OR 'underserved countr*' OR 'resource 22 limited country' OR 'Imic*' OR 'low income economy' OR 'middle income economy' OR 23 'underdeveloped countr*' OR 'underdeveloped economy' OR 'poor countr*' OR 'poor nation' OR 24 'world health' OR 'middle-income countr*' OR 'transitional countr*' OR 'lower middle income 25 countr*' OR 'upper middle income' OR 'less developed countr*' OR 'lesser developed countr*' 26 OR 'developing countr*' OR 'developing nation' OR 'lower-middle income countr*' OR 'upper-27 middle income countr*' OR 'low-income countr*' OR 'deprived countr*' OR 'low gdp' OR 'lami 28 countr*' OR 'poorer nation' OR 'under served countr*' OR 'under served nation' OR 'lower 29 income population' OR 'low income population' OR 'developing world' OR 'africa' OR 'asia' OR 30 'caribbean' OR armenian OR aruba OR byelorussian OR belarus OR belorussian OR belorussia 31 OR bosnia OR herzegovina OR hercegovina OR brasil OR 'comoro islands' OR comores OR 32 mayotte OR zaire OR 'ivory coast' OR 'slovak republic' OR 'french somaliland' OR 'east timur' 33 OR 'timor leste' OR 'united arab republic' OR 'gabonese republic' OR gaza OR 'georgia republic' 34 OR 'georgian republic' OR 'gold coast' OR guiana OR maldives OR 'isle of man' OR kazakh OR 35 kiribati OR kirghizia OR 'kyrgyz republic' OR kirghiz OR kirgizstan OR basutoland OR 'malagasy 36 37 republic' OR malaya OR malay OR sabah OR sarawak OR nyasaland OR 'marshall islands' OR 38 'agalega islands' OR moldovia OR moldovian OR ifni OR myanma OR burma OR 'northern 39 mariana islands' OR muscat OR palestine OR philipines OR philipines OR philippines OR 40 rumania OR roumania OR russian OR ruanda OR 'saint kitts' OR 'st kitts' OR nevis OR 'st lucia' 41 OR 'st vincent' OR 'samoan islands' OR 'navigator island' OR 'navigator islands' OR 'sao tome' 42 OR ceylon OR 'solomon islands' OR surinam OR tadzhikistan OR tadjikistan OR tadzhik OR 43 'togolese republic' OR turkmen OR 'soviet union' OR 'union of soviet socialist republics' OR 44 uzbek OR 'new hebrides' OR 'viet nam' OR 'west bank' OR rhodesia OR africa OR 'africa, 45 northern' OR 'africa south of the sahara' OR 'africa, central' OR 'africa, eastern or africa, 46 southern' OR 'africa, western or asia' OR 'asia, central' OR 'asia, southeastern' OR 'asia, 47 western' OR 'caribbean region' OR 'west indies' OR 'south america' OR 'latin america' OR 48 'central america' OR afghanistan OR albania OR algeria OR 'american samoa' OR angola OR 49 antigua OR barbuda OR argentina OR armenia OR azerbaijan OR bahrain OR bangladesh OR 50 barbados OR benin OR byelarus OR belize OR bhutan OR bolivia OR 'bosnia-herzegovina' OR 51 botswana OR brazil OR bulgaria OR 'cape verde' OR 'central african republic' OR chad OR 52 chile OR china OR colombia OR comoros OR congo OR 'costa rica' OR 'cote d ivoire' OR 53 croatia OR cuba OR cyprus OR czechoslovakia OR 'czech republic' OR slovakia OR diibouti 54 OR 'democratic republic of the congo' OR dominica OR 'dominican republic' OR 'east timor' OR 55 ecuador OR egypt OR 'el salvador' OR eritrea OR estonia OR ethiopia OR fiji OR gabon OR 56 57 58

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Date of Initial Search: Feb 6, 2020; Date of second search: Nov 30 2020 TS= 'Access' AND ('availability' OR 'availabl*' OR 'affordab*' OR 'cost' OR 'distance' OR 'spatial' OR 'barrier' OR 'barriers' OR 'quality') ANDAND

(emergency responder" OR "emergency responders" OR "emergency doctor" OR "emergency doctors" OR "emergency clinician" OR "emergency clinicians" OR "emergency physician" OR "emergency physicians" OR "emergency personnel" OR "emergency medical personnel" OR "emergency service" OR "emergency services" OR "emergency medical service" OR "emergency medical services" OR "emergency medicine" OR "emergency health service" OR "emergency health services" OR "emergency care" OR "emergency healthcare" OR "emergency treatment" OR "emergency treatments" OR "emergency department" OR "emergency departments" OR "emergency room" OR "emergency rooms" OR "emergency ward" OR "emergency wards" OR "emergency unit" OR "emergency units" OR "emergency hospital" OR "emergency hospitals" OR "emergency clinic" OR "emergency clinics" OR "emergency setting" OR "emergency staff" OR "emergency response" OR "emergency medical technician" OR "emergency medical technicians" OR "paramedic" OR "paramedics" OR "ambulance" OR "ambulances" OR "ER" OR "first responder" OR "first responders" OR "rescue work" OR "rescue worker" OR "rescue workers" OR "relief work" OR "relief worker" OR "relief workers" OR "firefighter" OR "firefighters" OR "fire fighter" OR "fire fighters" OR "trauma center" OR "trauma centers" OR "trauma unit" OR "trauma units" OR "critical care" OR "critical illness" OR "critical illnesses" OR "resuscitation" OR "shock" OR "sepsis" OR "septicemia" OR "septicaemia" OR "acute care" OR "acute disease" OR "acute diseases" OR "prehospital" OR "pre hospital" OR "wound" OR "wounds" OR "triage" OR "pregnancy complication" OR "pregnancy complications" OR "obstetric complication" OR "obstetric complications" OR "obstetric emergency" OR "obstetric emergencies") AND

TS=("developing countr*" OR "developing nation*" OR "developing population*" OR "less developed countr*" OR "less developed nation*" OR "less developed population*" OR "lesser developed countr*" OR "lesser developed nation*" OR "lesser developed population*" OR "lesser developed world" OR "least developed countr*" OR "least developed nation*" OR "least developed population*" OR "least developed world" OR "under developed countr*" OR "under developed nation*" OR "under developed population*" OR "under developed world" OR "underdeveloped countr*" OR "underdeveloped nation*" OR "underdeveloped population*" OR "underdeveloped world" OR "middle income countr*" OR "middle income nation*" OR "middle income population*" OR "low income countr*" OR "low income nation*" OR "low income population" OR "low income population*" OR "lower income countr*" OR "lower income nation*" OR "lower income population*" OR "underserved countr*" OR "underserved nation*" OR "underserved population*" OR "underserved world" OR "under served countr*" OR "under served nation*" OR "under served population*" OR "under served world" OR "deprived countr*" OR "deprived nation*" OR "deprived population*" OR "deprived world" OR "poor countr*" OR "poor nation*" OR "poor population*" OR "poor world" OR "poorer countr*" OR "poorer nation*" OR "poorer population*" OR "poorer world" OR "developing econom*" OR "less developed econom*" OR "lesser developed econom*" OR "under developed econom*" OR "underdeveloped econom*" OR "middle income econom*" OR "low income econom*" OR "lower income econom*" OR "low gdp" OR "low gnp" OR "low gross domestic" OR "low gross national" OR "lower gdp" OR "lower gnp" OR "lower gross domestic" OR "lower gross national" OR Imic OR Imics OR "third world" OR "lami countr*" OR "transitional countr*" OR Africa OR Asia OR Caribbean OR West Indies OR South America OR Latin America OR Central America OR Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR

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Initial Search Date: Feb 6, 2020

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	Adewole	Adewole OA, Fadeyibi IO, Kayode MO, Giwa SO, Shoga MO, Adejumo AO, Ademiluyi SA. Ambulance services of	Nigeria	African	Low	Lagos State	Regional	Urban	nal Qual I for	Cross sectional	2001- 2006	32,774	Cases
8 9		Lagos state, Nigeria: a six-year (2001-2006) audit. West Afr							ы Б ш Б	ocononiai	2000		
10	Ahmed	J Med. 2012;31:3–7. Ahmed S, Adams AM, Islam R, Hasan SM, Panciera R.	Bangladesh	South-Eas	tlower-	Dhaka	Regional	Urban	April ⁵¹ Ensei uses re	Cross	2014	N/A	N/A
11	/ inned	Impact of traffic variability on geographic accessibility to 24/7		Asia	middle	Briana	regional	orban	2023 Jigne	sectional	2014	11// (
12		emergency healthcare for the Urban poor: A GIS study in Dhaka, Bangladesh. PLoS One. 2019;14(9):e0222488.											
₃ 13	Ali	Ali M, Miyoshi C, Ushijima H. Emergency medical services in	Pakistan	South-Eas	tLower-	Islamabad	Regional	Urban	ର୍ଥ୍ୟୁ କିମ୍ବ	Mixed	2000-	N/A	N/A
14		Islamabad, Pakistan: a public-private partnership. Public		Asia	middle				t Su	methods	2001		
15 4	Alibhai	Health. 2006;120:50–7. Alibhai A, Hendrikse C, Bruijns SR. Poor access to acute	Multinational	African	N/A	N/A	International	N/A	. Downloaded ment Superieu ed to text and o	Descriptive	2016	392	Conference
16		care resources to treat major trauma in low- and middle-							rieu nd o	Survey			delegates
17 19		income settings: A self-reported survey of acute care providers. Afr J Emerg Med. 2019;9(Suppl):S38-S42.							froi dat				
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20		Mercado MLL, Dela Cruz MPZ, Licuan DA, Villalon EES 3rd, Baguilod MS, Hernandez LM, Taylor LH, Nel LH. The		Pacific	middle	Vizcaya, Palawan and				survey			
20		evaluation of Animal Bite Treatment Centers in the				Tarlac Districts	;		ng,				
22		Philippines from a patient perspective. PLoS One. 2018 Jul							≥ 3				
22	Anest	26;13(7):e0200873. Anest T, Stewart de Ramirez S, Balhara KS, Hodkinson P,	South Africa	African	Upper-	Cape Town	Regional	Urban) .) . ing, Al trai	Descriptive	2013	24	Interviewed
24		Wallis L, Hansoti B. Defining and improving the role of			middle		- 5		ining,	Interview			individuals
25		emergency medical services in Cape Town, South Africa. Emerg Med J. 2016;33(8):557-61.							ining, and si				
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27		hypothetical accessibility challenges for emergency services. Jamba. 2019;11(2):681.			middle				d si	sectional			
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30 21		explain their choices and experiences. Tropical Medicine & InterNational Health 12(4): 564–574.							ne 1 iech				
31 9 32	Bachani	Bachani AM, Botchey I, Paruk F, Wako D, Saidi H, Aliwa B,		African	Lower-	Kenya	National	N/A		Cross	2011	N/A	N/A
33		et al. Nine-point plan to improve care of the injured patient: A case study from Kenya. Surgery. 2017;162(6S):S32-S44.	١		middle				une 1脑 2025 여 r technologie	sectional			
~ 4	Bast		Honduras	Americas	Lower-	Honduras	National	N/A	Jies Qual	Descriptive	2018	N/A	N/A
35	Dasi	Honduras. Prehosp Disaster Med. 2018;33(6):637-9.	nonuuras	Americas	middle	Tionuuras	National	IN/A	- Quat Ag	Interview	2010	N/A	IN/A
1 3 6	Bhopal	Bhopal SS, Halpin SJ, Gerein N. Emergency obstetric	Sierra Leone	African	Low	Kambia region	Regional	Rural	Bo ff	Mixed	2013	N/A	N/A
37		referral in Rural Sierra Leone: what can motorbike				C C	0		Boffice	methods			
38		ambulances contribute? A mixed-methods study. Matern Child Health J. 2013;17:1038–43.							Bib				
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12 4 5	Bigdeli	Bigdeli M, Khorasani-Zavareh D, Mohammadi R. Pre- hospital care time intervals among victims of road traffic injuries in Iran. A cross-sectional study. Bmc Public Health. 2010;10.	Iran	Eastern Mediterran ean	Upper- middle	Urmia, Iran	Regional	Urban	220067884 on Quido 67884 on Quido 67884 Quido 67884 on Quido 67884 On Quido 67884 On Quido 67884	Cross sectional	2005- 2007	N/A	N/A
19 7 8	Broccoli	Broccoli MC, Calvello EJ, Skog AP, Wachira B, Wallis LA. Perceptions of emergency care in Kenyan communities lacking access to formalised emergency medical systems: a	Kenya	African	Lower- middle	Kenya	National	N/A	ng for	Descriptive Interview	2015	528	Focus group members
14 10 11	Broccoli	Community-based perceptions of emergency care in Zambian communities lacking formalised emergency	Zambia	African	Lower- middle	Zambia	National	N/A	April 2023. Bownloaded Edseignerdent Superie uses related to text and	Descriptive Interview	2016	183	Focus group members
152 13 14	Burke	medicine systems. Emerg Med J. 2016;33(12):870-5. Burke TF, Hines R, Ahn R, Walters M, Young D, Anderson RE, et al. Emergency and urgent care capacity in a resource-limited setting: an assessment of health facilities in	Kenya	African	Lower- middle	Western Kenya	Regional	Both	13. Bown	Descriptive Interview	2013- 2014	60	Key informants
15 16 16 17	Chunga	western Kenya. BMJ Open. 2014;4(9):e006132. Chunga R, Bruijns SR, Hendrikse C. Access to acute care resources in various income settings to treat new-onset stroke: A survey of acute care providers. Afr J Emerg Med.		N/A	N/A	N/A	International	N/A	lloaded f superieu xt and d	Descriptive Survey	2016	382	Healthcare Providers
18 ¹ 19 20	Comery	2019;9(2):77-80. Comery B, Perry WRG, Young S, Dare A, Matalavea B, Bissett IP, Windsor JA. Delivery of surgical care in Samoa: perspectives on capacity, barriers and opportunities by local	Samoa	Western Pacific	Lower- middle	Samoa	National		l fron <u>€http</u> ur (ASES) data minir	Descriptive Interview	2016	N/A	Key informants
21 ¹ 82	Coyle	providers. ANZ J Surg. 2020 Oct;90(10):1910-1914.	Sierra Leone	African	Low	Freetown, Sierra Leone	Regional	Urban	.∥bn , ∕	Cross sectional	2015	N/A	N/A
23 1294 25	De Wulf	Med. 2015;15(1):2 DeWulf A, Otchi EH, Soghoian S. Identifying priorities for quality improvement at an emergency Department in Ghana.	Ghana	African	Lower- middle	Urban Ghana.	Local	Urban	raining,	Descriptive Survey	5-Jul	18	EU staff members
26 27 28	De Wulf	BMC Emerg Med. 2017;17(1):28. De Wulf A, Aluisio AR, Muhlfelder D, Bloem C. Emergency Care Capabilities in North East Haiti: A Cross-sectional Observational Study. Prehosp Disaster Med.	Haiti	Americas	Low	Fort Liberté District, Haiti	Regional	Rural	giopendomj.com/ on . G Al training, and simila	Cross sectional	2012	N/A	N/A
29 21 30	El Tayeb	2015;30(6):553-9. El Tayeb S, Abdalla S, Van den Bergh G, Heuch I. Use of healthcare services by injured people in Khartoum State,	Sudan	Mediterran	Lower- middle	Sudan	Regional	Urbon		Descriptive Survey	2010	N/A	N/A
31 2 3 2 33	Elbashir	Sudan. InterNational Health. 2015;7(3):183-9. Elbashir K, Gore RJ, Abuaaraki T, Roblin P, Botha M, Yousif M, Ostrovskiys G, Bloem C, James SA. Prehospital emergency care and injury prevention in Sudan. Afr J Emerg		ean African	Low	Sudan	National	N/A	technologies	Cross sectional	2008 - 2014	N/A	N/A
34 2 3 5 36	Emerick	Access to medicines for acute illness in middle income countries in Central America. Rev Saude Publica.	Multinational	Americas	N/A	Central American Countries	International		ataAgence	Cross sectional	2013	2,761	Households
37 2 9 8 39 40 41	Hashtarkhani	2013;47(6):1069-79. Hashtarkhani S, Kiani B, Bergquist R, Bagheri N, VafaeiNejad R, Tara M. An age-integrated approach to improve measurement of potential spatial accessibility to emergency medical services for Urban areas. Int J Health Plann Manage. 2020;35(3):788-98.	Iran	Eastern Mediterran ean	Upper- middle	Mashhad City, Iran	Regional	Urban	ce bibliographique de	Cross sectional	2016	N/A	N/A
42 43 44			aly http://	hmionar	hmi com (c	ito/about/au	dolines vet	~1	hique de				
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1 2									mjopen-202; by copyrigh				
2ම් 4 5	Hodkinson	Hodkinson PW, Pigoga JL, Wallis L. Emergency healthcare needs in the Lavender Hill suburb of Cape Town, South Africa: a cross-sectional, community-based household survey. BMJ Open. 2020;10(1):e033643.	South Africa	African	Upper- middle	Lavender Hill suburb of Cape Town, South Africa	Regional	Urban	22a067884 or G ht, including	Descriptive Survey	2018	2754	Interviewed individuals
268 7 8	Hsia	Hsia RY, Mbembati N/A, Macfarlane S, Kruk ME. Access to emergency and surgical care in sub-Saharan Africa: the infrastructure gap. Health Policy Plan. 2012;27(3):234-44.	Multinational	African	N/A	Ghana, Kenya Rwanda, Tanzania, Uganda	, International	N/A	ng for	Cross sectional	2012	N/A	N/A
2 7 10 11	Jacobs	Jacobs B, Men C, Sam OS, Postma S. Ambulance services as part of the district health system in low-income countries: a feasibility study from Cambodia. InterNational Journal of Health Planning and Management. 2016;31(4):414-29.	Cambodia	South-Eas Asia	tLower- middle	Cambodia	National	N/A	Ap <u>e</u> l 2023. Eoseigner uses relate	Descriptive Interview	2013	N/A	N/A
28 ² 13	Khan	Khan AN, Rubin DH. 2003. InterNational pediatric emergency care: establishment of a new specialty in a	Kosove	European Region	Upper- middle	Pristina University	Local	Urban	d to	Cross sectional	2002	N/A	N/A
14 295 16	Khan	developing country. Pediatric Emergency Care 19(3): 0181 Khan A, Zafar H, Naeem SN, Raza SA. Transfer delay and in-hospital mortality of trauma patients in Pakistan. Int J Surg. 2010;8:155–8.	Pakistan	South-Eas Asia	tLower- middle	Hospital Aga Khan University Hospital,	Local	Urban	Superie Superie	Cross sectional	1998- 2005	N/A	N/A
17 ³ 98 19 20	Kirsch	Kirsch T, Hilwig W, Holder Y, Smith G, Pooran S, Edwards R. 1995. Epidemiology and practice of emergency medicine in a developing country. Annals of Emergency Medicine 26(3): 361–367.		Americas	Lower- middle	Karachi Port of Spain,	Local	Urban	d from http://tor eur@ABES) ط I data mining, <i>i</i>	Descriptive Interview	N/A	N/A	N/A
³ 21 22 23	Kumar	Kumar S, Chaudhary S, Kumar A, Agarwal AK, Misra MC. Trauma care - a participant observer study of trauma centers at Delhi, Lucknow and Mumbai. Indian J Surg. 2009;71:133- 41.		South-Eas Asia	stLower- middle	Delhi, Lucknow, Mumbai	Regional	Urban	ng, Al tra	Cross sectional	2009	N/A	N/A
3224 25 26	Levine	Levine AC, Presser DZ, Rosborough S, Ghebreyesus TA, Davis MA. Understanding barriers to emergency care in low- income countries: view from the front line. Prehosp Disaster Med. 2007;22(5):467-70.	Ethiopia	African	Low	Tigray	Regional	Rural	Al training, and	Descriptive Survey	2006	N/A	N/A
3 <u>2</u> 7 28 29	Luo	Luo W, Yao J, Mitchell R, Zhang X. Spatiotemporal access to emergency medical services in Wuhan, China: accounting for scene and transport time intervals. Int J Health Geogr. 2020;19(1):52		Western Pacific	Upper- middle	Wuhan	Regional	Urban	simi on	Cross sectional	2020	N/A	N/A
3 3 40 31	Macharia	Macharia WM, Njeru EK, Muli-Musiime F, Nantulya V. Severe road traffic injuries in Kenya, quality of care and access. Afr Health Sci. 2009;9(2):118-24.	Kenya	African Region	Lower- middle	Kenya	National	N/A		Cross sectional	1997- 1998	N/A	N/A
352 33 33	Mahmood	Mahmood KT, Amin F, Ayub H, Yaqoob M, Zaka M. Management of the patient from the site of accident to the hospital/ pre-hospital care. J Pharm Sci Res. 2010;2:804–8.	Pakistan	South-Eas Asia	t Lower- middle	Pakistan	National	N/A	2025 Digi	Cross sectional	2010	N/A	N/A
34 365 36 37 38	Mathew	Mathew A, Abdullakutty J, Sebastian P, Viswanathan S, Mathew C, Nair V, et al. Population access to reperfusion services for ST-segment elevation myocardial infarction in Kerala, India. Indian Heart J. 2017;69 Suppl 1(Suppl 1):S51- S6.	India	South-Eas Asia	tLower- middle	Kerala	Regional	Urban	atant Quant S.	Cross sectional	2017	N/A	N/A
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1 2 3 7 4 5 6 7	Mock	Mock C, nii-Amon-Kotei D, Maier R. 1997. Low utilization of formal medical services by injured persons in a developing nation: health service data underestimate the importance of trauma. The Journal of Trauma: Injury, Infection, nd Critical Care 42(3): 504–513.	Ghana	African	Lower- middle	Ghana	National	N/A	136/bmjopen-202حص67884 on 17 ح cted by copyright, including for	Descriptive Interview	1995	21105	Interviewed individuals
38 9 10	Mock	Mock C, Ofosu A, Gish O. 2001. Utilization of district health services by injured persons in a Rural area of Ghana. The InterNational Journal of Health Planning and Management 16: 19–32.	Ghana	African	Lower- middle	Ghana	National	N/A	aApril 2 Ensei uses n	Descriptive Interview	1995	9442	interviewed individuals
3b1 12 13 14	Mock	Mock C, Nguyen S, Quansah R, Arreola-Risa C, Viradia R, Joshipura M. 2006. Evaluation of trauma care capabilities in four countries using the WHO-IATSIC Guidelines for essential trauma care. World Journal of Surgery 30: 946– 956.	Multinational	N/A	N/A	Mexico, Vietnam, India Ghana	International	N/A	2033. Downloaded eignement Superieu related to text and	Descriptive Interview	2006	N/A	N/A
405 16 17 18	Mohan	Mohan B, Bansal R, Dogra N, Sharma S, Chopra A, Varma S, et al. Factors influencing prehospital delay in patients presenting with ST-elevation myocardial infarction and the impact of prehospital electrocardiogram. Indian Heart J. 2018;70 Suppl 3(Suppl 3):S194-S8.	India	South-Eas Asia	t Lower- middle	Punjab	Regional	Urban	from Jr (A data	Cross sectional	2015	619	Patients
419 20 21	Mould- Millman	Mould-Millman NK, Oteng R, Zakariah A, Osei-Ampofo M, Oduro G, Barsan W, et al. Assessment of Emergency Medical Services in the Ashanti Region of Ghana. Ghana Med J. 2015;49(3):125-35.	Ghana	African	Lower- middle	Ashanti Regio	nRegional	Urban	natp:// 30译S). mining	Cross sectional	2012	N/A	N/A
422 23 24 25	Mould- Millman	Mould-Millman NK, Rominski SD, Bogus J, Ginde AA, Zakariah AN, Boatemaah CA, et al. Barriers to Accessing Emergency Medical Services in Accra, Ghana: Development of a Survey Instrument and Initial Application in Ghana. Glob Health Sci Pract. 2015;3(4):577-90.		African	Lower- middle	Accra	Regional	N/A	bmtopen.bmj.com/ ر م ا, Al training, and sii	Cross sectional	2013	468	Survey participants
426 27 28	Mould- Millman		Multinational	African	N/A	N/A	International	N/A	om/ on Quan/ on and simi	Cross sectional	2013- 2014	N/A	N/A
4 4 9 30 31	Nagata	Nagata T, Takamori A, Kimura Y, Kimura A, Hashizume M, Nakahara S. Trauma center accessibility for road traffic injuries in Hanoi, Vietnam. J Trauma Manag Outcomes. 2011:5:11.	Vietnam	South-Eas Asia	t Lower- middle	Hanoi	Regional	Urban	n/ on June 11, ភ្នំដ Q I similar technolo	Cross sectional	2006	N/A	N/A
4 <u>3</u> 2 33 34	Natuzzi	Natuzzi ES, Kushner A, Jagilly R, Pickacha D, Agiomea K, Hou L, Houasia P, Hendricks PL, Ba'erodo D. Surgical care in the Solomon Islands: a road map for universal surgical care delivery. World J Surg. 2011 Jun;35(6):1183-93.		Western Pacific	Lower- middle	Outer Islands	Regional	Rural	, 2025 at / Qu ologies.	Cross sectional	2009- 2010	9	Health facilities
36 37	Nielsen	Nielsen K, Mock C, Joshipura M, Rubiano AM, Zakariah A, Rivara F. Assessment of the status of prehospital care in 13 low- and middle-income countries. Prehosp Emerg Care. 2012;16:381–9.	Multinational	N/A	N/A	13 LMICs in Africa, Asia, and Latin America	International	N/A	Qu dence B	Descriptive Survey	2009– 2010	N/A	N/A
40 41 42 43	Ntabaye	Ntabaye MK, Scheutz F, Poulsen S. 1998. Household survey of access to and utilization of emergency oral health care services in Rural Tanzania. East African Medical Journal 75(11): 649–653.	Tanzania	African	Lower- middle	Rungwe district, Mbeya region	Regional	Rural	sitaliographique de	Descriptive Survey	1998	1,106	Households
44 45 46 47		For peer review of	only - http://	bmjopen.	.bmj.com/s	ite/about/gui	idelines.xht	ml	le I				

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1 2									oen-20% opyrig				
48 4 5 6	Ouma	Ouma PO, Maina J, Thuranira PN, Macharia PM, Alegana VA, English M, et al. Access to emergency hospital care provided by the public sector in sub-Saharan Africa in 2015: a geocoded inventory and spatial analysis. Lancet Glob Health. 2018;6(3):e342-e50.	MutiNational	African	N/A	N/A	International	N/A	136/bmjopen-20225067884 or cted by copyright, including	Cross sectional	2018	N/A	N/A
40 8 9 10 11	Phillips	Phillips G, Creaton A, Airdhill-Enosa P, Toito'ona P, Kafoa B O'Reilly G, Cameron P. Emergency care status, priorities and standards for the Pacific region: A multiphase survey and consensus process across 17 different Pacific Island Countries and Territories. Lancet Reg Health West Pac. 2020 Aug;1:100002.	,Multinational	Western Pacific	N/A	17 regional countries	International	N/A	∙on∄7 April 2023∋ D B Enseign@me ing for uses related	Descrriptive interviews & surveys		17	Key informants
⁵ θ ₂ 13 14 15	Pigoga	Pigoga JL, Joiner AP, Chowa P, Luong J, Mhlanga M, Reynolds TA, et al. Evaluating capacity at three government referral hospital emergency units in the kingdom of Eswatini using the WHO Hospital Emergency Unit Assessment Tool. BMC Emerg Med. 2020;20(1):33.	Eswantini	African	Lower- middle	Eswantini	National	N/A	23 Downloaded noment Superieu ated to text and d	Cross sectional	2018	11`	Key informants
⁵ 16 17	Radjou	Radjou AN, Mahajan P, Baliga DK. Where do I go? A trauma victim's plea in an informal trauma system. J Emerg Trauma Shock. 2013;6:164–70.		South-Eas Asia	tLower- middle	Puducherry territory	Regional	Urban	ded from लोeur (अप्रे and data	Cross sectional	2009- 2010	N/A	N/A
5128 19 20	Razzak	Razzak J, Cone D, Rehmani R. 2001. Emergency medical services and cultural determinants of an emergency in Karachi, Pakistan. Prehospital Emergency Care 5(3): 312–316.	Pakistan	South-Eas Asia	t Lower- middle	Karachi	Regional	Urban	on http: (ABES) Ita minin	Descriptive Interview	2001	N/A	N/A
5&1 22 23	Ro	Ro YS, Shin SD, Jeong J, Kim MJ, Jung YH, Kamgno J, et al. Evaluation of demands, usage and unmet needs for emergency care in Yaounde, Cameroon: a cross-sectional study. Bmj Open. 2017;7(2).	Cameroon	African	Lower- middle	Yaoundé	Regional	Urban	 g, Al trai	Cross sectional	2017	658	Households
5 4 4 25 26 27	Rocha	Rocha TAH, da Silva NC, Amaral PV, Barbosa ACQ, Rocha JVM, Alvares V, et al. Addressing geographic access barriers to emergency care services: a National ecologic study of hospitals in Brazil. Int J Equity Health. 2017;16(1):149.	Brazil	Americas	Upper- middle	Brazil	National	N/A	http://amjopen_amj.com/ BES) .d mining, Al training, and s	Cross sectional	2017	N/A	N/A
5288 29 30	Rocha	Rocha TAH, da Silva NC, Amaral PV, Barbosa ACQ, Rocha JVM, Alvares V, et al. Access to emergency care services: a transversal ecological study about Brazilian emergency health care network. Public Health. 2017;153:9-15.		Americas	Upper- middle	Brazil	National	N/A	imilar tec	Cross sectional	2017	N/A	N/A
58)1 32 33	Roy	Roy N, Murlidhar V, Chowdhury R, Patil SB, Supe PA, Vaishnav PD, Vatkar A. Where there are no emergency medical services-prehospital care for the injured in Mumbai, India. Prehospital Disaster Med. 2010;25:145–51.	India	South-Eas Asia	t Lower- middle	Mumbai	Local	Urban	ਸ਼ੀ, 2025 Qua chnologie	Cross sectional	2005	170	Patients
5 3 4 35 36	Scolari	Scolari GAS, Rissardo LK, Baldissera VDA, Carreira L. Emergency care units and dimensions of accessibility to health care for the elderly. Rev Bras Enferm. 2018;71 Suppl†2:811-7.	Brazil	Americas	Upper- middle	Brazil	National	N/A	es. Quar Agencant Quant	Descriptive Survey	2018	N/A	N/A
38 39 40 41 42 43	Sheikhbardsii i	Sheikhbardsiri H, Esamaeili Abdar Z, Sheikhasadi H, Ayoubi Mahani S, and Sarani A. Observance of patients' rights in emergency department of educational hospitals in south- east Iran. International Journal of Human Rights in Healthcare. 2020; 13 (5):435-444.	Iran	Eastern Mediterran ean	Upper- middle	Kerman	Regional	Urban	ce Bibliographique de l Q	Descriptive survey	2018	382	Patients
44 45 46 47		For peer review of	only - http://	'bmjopen.	bmj.com/s	ite/about/gu	idelines.xhti	ml	Ye I				

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1 2									oen-20; opyrig				
4		Siddiqui M, Siddiqui SR, Zafar A, Khan FS. Factors delaying hospital arrival of patients with acute stroke. J Pak Med Assoc. 2008;58:178–82.	Pakistan	South-Eas Asia	tLower- middle	Karachi	Local	Urban	2270678 Quino ht, incl	Cross sectional	2006- 2007	165	Patients
560 7	Sodemann	Sodemann M, Biai S, Jakobsen MS, Aaby P. Knowing a	Guinea- Bissau	African	Low	Guinea-Bissa	u Local	Urban	a06788a on 17	Descriptive Interview	2001	1572	Patients
8 6 10 11	Sohayla		Malaysia	Western Pacific	Upper- middle	Shah Alam	Local	Urban	uses	Descriptive survey	2020	300	Survey participants
		Stein C, Mould-Millman NK, De Vries S, Wallis L. Access to out-of-hospital emergency care in Africa: Consensus conference recommendations. Afr J Emerg Med. 2016;6(3):158-61.	MutiNational	African	N/A	N/A	N/A	N/A	2023ରୁ Downloaded eignement Superieu related to text and	Cross sectional	2015	N/A	N/A
6\$5 16 17	Sultan	Sultan M, Abebe Y, Tsadik AW, Ababa A, Yesus AG, Mould- Millman NK. Trends and barriers of emergency medical service use in Addis Ababa; Ethiopia. BMC Emerg Med. 2019;19(1):28.	Ethiopia	African	Low	Ethiopia	National	N/A	onded fro underieur xt and da	Cross sectional	2017	429	survey participants
	Suriyawongp aisal	Suriyawongpaisal P, Atiksawedparit P, Srithamrongsawad S, Thongtan T. Closing the Equity Gap of Access to Emergency Departments of Private Hospitals in Thailand. Emerg Med Int. 2018;2018:6470319.		South-Eas Asia	t Upper- middle	Thailand	National	N/A	from http:/ ur (ABES) data minin	Cross sectional	2017	20,206	patients
	aisal	Suriyawongpaisal P, Aekplakorn W, Srithamrongsawat S, Srithongchai C, Prasitsiriphon O, Tansirisithikul R. Copayment and recommended strategies to mitigate its impacts on access to emergency medical services under universal health coverage: a case study from Thailand. BMC Health Serv Res. 2016;16(1):606.	Thailand	South-Eas Asia	t Upper- middle	Thailand	National	N/A	http://۲۵mjopen.bmj.۲۵ BES) .C mining, Al training, an	Mixed methods	2012	N/A	N/A
6266 27 28		Tansley G, Schuurman N, Amram O, Yanchar N. Spatial Access to Emergency Services in Low- and Middle-Income Countries: A GIS-Based Analysis. PLoS One. 2015;10(11):e0141113.	Multinational	N/A	N/A	N/A	International	N/A	and similar	Cross sectional	2015	N/A	N/A
30 31	Tansley		Ghana	African	Lower- middle	Ghana	National	N/A		Cross sectional	2016	N/A	N/A
6 3 2 33	Thomson	e	Zimbabwe	African	Lower- middle	Zimbabwe	National	N/A	ne 11, <u>3</u> 025 G technologie	Cross sectional	2005	N/A	N/A
6 3 4 35 36		Treleaven E, Pham TN, Le DN, Brooks TN, Le HT, Partridge JC. Referral patterns, delays, and equity in access to advanced paediatric emergency care in Vietnam. Int J Equity Health. 2017;16(1):215.		Western Pacific	Lower- middle	Hanoi	Local	Urban	S Quent Agencont Quent	Cross sectional	2013	557	Patients
38	Vanderschur en	Vanderschuren M, McKune D. Emergency care facility access in Rural areas within the golden hour?: Western	South Africa	African	Upper- middle	South Africa	Regional	Rural	Qu e nt	Cross sectional	2015	N/A	N/A
39 740 41 42 43	Wen	Cape case study. Int J Health Geogr. 2015;14:5. Wen LS, Char D. Existing infrastructure for the delivery of emergency care in post-conflict Rwanda: an initial descriptive study. Acad Emerg Med. 2011;18:S243.	Rwanda	African	Low	Kigali	Regional	Urban	Bibli <u>æ</u> graphique de l G	Mixed methods	2007	60	Health care workers
44 45 46 47		For peer review o	only - http://	′bmjopen.	.bmj.com/s	ite/about/gu	idelines.xht	ml	e de l				

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1 2									oen-20 opyrig				
72 4 5	Wesson	Wesson HK, Stevens KA, Bachani AM, Mogere S, Akungah D, Nyamari J, Masasabi Wekesa J, Hyder AA. Trauma systems in Kenya: a qualitative analysis at the district level. Qual Health Res. 2015 May;25(5):589-99.	Kenya	African	Lower- middle	Kenya	Regional	Urban	122 20 67884 ^{ent} Quant ght, including	Descriptive Interview	2011	N/A	N/A
79 7 8	WHO/ UNICEF	WHO/UNICEF. Water, Sanitation and Hygiene in Health Care Facilities: Status in Low and Middle Income Countries and Way Forward. Geneva, Switzerland: World Health Organization, 2015.	Multinational	N/A	Lower and middle	54 countries	International	NA	ng Quent ng for	Cross- sectional	1998- 2014	90	Heath care facilities
74 10 11 12	Zaidi	Zaidi SM, Labrique AB, Khowaja S, Lotia-Farrukh I, Irani J, Salahuddin N, et al. Geographic variation in access to dog- bite care in Pakistan and risk of dog-bite exposure in Karachi: prospective surveillance using a low-cost mobile	Pakistan	Eastern Mediterrar ean	Lower- middle	Karachi	Regional	Urban	l 203 seig s rel	Cross sectional	2009- 2011	N/A	N/A
75 ³ 14 15 16	Zimmerman	phone system. PLoS Negl Trop Dis. 2013;7(12):e2574. Zimmerman A, Fox S, Griffin R, Nelp T, Thomaz E, Mvungi M, et al. An analysis of emergency care delays experienced by traumatic brain injury patients presenting to a regional referral hospital in a low-income country. PLoS One.	Tanzania	African	Low	Tanzania	Regional	Urban		Cross sectional	2013- 2017	3209	Patients
-17		2020;15(10):e0240528.	8						d fro d dat				
18 19									rom http://bmjopen.bmj.com/ on June 11, 2025 r (ABES) . lata mining, Al training, and similar technologic				
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3		Individual access measures and ou	tcomes by article.
Reference 5No.	Author (year)	Measures	Outcomes
<u>ф</u> 7	Adewole (2012)	1. Geographic barriers	1. Rural population has less access, traffic impedes access
7 <u>2</u> 8	Ahmed (2019)	Percent of slums that have	Percent of slums that have
9		1. 1 EU per 50,000 population	1. 12%
10		2. 1 burn unit per 50,000 population	2. 0%
10		Percent of population that lives	Percent of population that lives
12		3. Within 60 minutes of EU	3. 63% e
12 1 ₃ 3		4. Within 60 minutes of burn unit	4. 32%
39 14	Ali (2006)	1. Average response time to accident	1. 10 min
4' 15	Alibhai (2019)	1. Resource issues	1. LMICs have less resources for trauma care
15 1 6	Amparo (2018)	1. Awareness of where to go for care	Percent of population that livesProtected by copyright3.63%4.32%1.10 min1.LMICs have less resources for trauma care1.7.4%2.44.9%1.22.7%2.44.9%3.5.6%1.Dispatchers lack training
17		2. Sought treatment for wounds	2. 44.9%
18			
19		Reasons for not seeking care	
20		1. Cost	1. 22.7% L
21 22		2. Distance	2. 44.9%
23		3. Sought traditional/alternative care	3. 5.6% Q
24	Anest (2016)	1. Training issues	1. Dispatchers lack training
25 26		2. Staffing issues	2. Shortages of physicians and EMS providers
27 28		3. Hospital system issues	 Shortages of physicians and EMS providers Errors in triage, lack of childcare for other children in the household and restrictive hours of clinic operations, multiple transfers
29 30		4. Pre-hospital system issues	4. Lack of transportation, Lack of telephone access and no universa emergency number.
31 32		5. Communication issues	regarding the acuity of the patient, misunderstanding of geography and
33 34		6. Barriers to reaching care	6. Community understanding of how to navigate the health system
35	Anyumba (2019)	1. Drive time from University of Venda Clinic to scene of accident	and emergency conditions 1. 5-7 minutes
36		2. Drive time Tshilidzini Hospital to scene of	2. 8-10 minutes
37 38		accident 3. Drive time from Donald Frazer hospital to	3. 30-45 minutes
39 30	Aries (2007)	scene of accident 1. Reason that patients do not seek hospital	3. 30-49 minutes a .
40	Alles (2007)	care	1. Lack of specialized fracture treatment
41		2. Barrier to prehospital care	2. Lack of resuscitation equipment
42		3. Cost of treatment by a bonesetter	3. Average 13 € (range 0–60 €)
43		4. Cost of hospital treatment	4. 300 € (range 25–800 €).
44		5. Barrier to seeking care	5. Opinion that bonesetters have more expertise.
45		Demographics associated with seeking hospital care	 Patients with compound fractures are more likely to be treated in a hospital.
46	Bachani (2017)	1. Training issues	1. Lack of training of pre-hospital and in-hospital providers
47		2. Resource issues	2. Lack of basic hospital equipment
48 49		3. Pre-hospital system issues	 B-10 minutes 3. 30-45 minutes Lack of specialized fracture treatment Lack of resuscitation equipment Average 13 € (range 0–60 €) 300 € (range 25–800 €). Opinion that bonesetters have more expertise. Patients with compound fractures are more likely to be treated in hospital. Lack of training of pre-hospital and in-hospital providers Lack of basic hospital equipment There was no functioning emergency number or coordinated response system. Lack of sufficient room and staffing
50	Bast (2018)	1. Staffing issues	1. Lack of sufficient room and staffing
51		2. Geographic issues	2. Access to facilities is limited by mountainous terrain.
52		3. Secondary financial strain	3. Not having adequate child care, the inability to miss work, or being too ill to walk.
53 54		4. Pre-hospital system issues	4. Lack of a universal EMS access code.
54 55 56	Bhopal (2013)	1. Barriers to seeking care	 Poor roads, rainy season inaccessibility, no mobile phone coverage, patient must buy petrol and pay driver, Awareness of ambulance service
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2 3		2. Pre-hospital system issues	2. Drivers willing to respond, maintenance i
412 5	Bigdeli (2010)	 Mean transport times from the scene to the hospital for interurban incidents compared to city areas 	1. 17.1 vs. 6.3 minutes
6 ₁₃ 7 8	Broccoli (2015)	 Characteristics that made it easier for patients to access care 	 When patients were dressed well, had a patience, had personal financial resources or in knew a healthcare provider
9 10		2. Barrier to care	2. Many providers were unfriendly towards provide care. Participants were also concerned
11 12		3. Training issues	3. Healthcare providers lack training in the l care.
13		4. Transportation issues	4. Difficulty obtaining transportation, long di travel.
14 15		5. Health system issues	 Lack of emergency care after business h before emergency care is provided and poor m lack of triage
16 17		6. Financial issues	6. High cost of treatment.
18		7. Pre-hospital system issues	 Officers take patients to the police station the hospital, creating delays.
19 20		8. Communication issues	8. Unavailable emergency phone lines
20 21		9. Staffing issues	9. Lack of healthcare provider
		10. Resource issues	10. Lack of resources and critical medication
21 2 23	Broccoli (2016)	1. Barrier to care	1. Lack of accessible healthcare facilities
23 24		2. Communication issues	2. No functional emergency phone number
24		3. Resource issues	 Lack of necessary equipment No standard national protocols for mass
25		4. Health system issues	triage
27		5. Staffing issues	5. Staff shortages
28		6. Training issues	6. Lack of specific training in emergency ca
29		7. Barrier to reaching care	7. The distance to travel to reach a facility
30 31		8. Transportation issues	8. The time it takes for transportation to arrivehicles and poor road conditions
32		9. Financial barriers	9. Money was a barrier when trying to obtai
33			10. Certain patients are required to be seen
34 35 36		10. Systems issues that generate delays	to receiving healthcare, which creates delays. higher-level facility with no care or stabilisation or during transport. Patients and families are re their transportation to the higher-level facility.
37 38		11. Barriers to seeking care	11. Lack of community knowledge about mee emergency care. Participants felt that facility st thought they should be quicker to provide eme
39 45	Burke (2014)	Percent of Level 2 and 3 Trauma facilities that:	Percent of Level 2 and 3 Trauma facilities that:
	()	1. had a specific approach to a trauma patient	1. 0%
41 42		2. refer trauma immediately	2. 87%
42 43		3. provide first aid and then refer trauma	3. 13%
43 44		patients	
44 45		4. are poorly equipped to handle broken bones	4. 70%
43 46		5. had suture and wound care supplies	5. 87%
40		6. had gloves	6. 90%
48		7. had oxygen	7. 23%
49		8. had splinting/casting supplies	8. 10%
50		9. had blood for transfusion	9. 0%
50		10. refer patients with a possible heart attack	10. 100%
52		11. refer patients with a possible heart attack immediately12. treat symptoms and then refer patients with a	11. 60%
53		possible heart attack	12. 27%
54 55		13. check vitals and then refer patients with a	13. 13%
55 56		possible heart attack 14. had sublingual nitroglycerine	14. 3%
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3	15. are ill prepared to handle possible diabetic	15. 93%
4	ketoacidosis (DKA) and must refer all cases	13. 33 //
5	16. had a glucometer	16. 20%
6	17. had insulin	17. 17%
7	18. refer cases of potential sepsis immediately	18. 50%
8	19. provide treatment for cases of potential	19. 37%
9	sepsis without referral 20. did not know an approach to sepsis	20. 13%
10	21. had antibiotics	21. 80%
11	22. had an organised approach to trauma	22. 30%
12	23. are notified in advance of patients arriving to	
13	the hospital	23. 13%
14	Percent of Level 4 and 5 facilities that:	Percent of Level 4 and 5 facilities that:
15	24. had gloves	24. 97%
16 17	25. had suture and wound care materials	25. 93%
17	26. had oxygen	26. 83%
18	27. did not have access to a trained provider who can administer general or Regional	27. 57%
19	anaesthesia	21. 3176
20	28. had morphine	28. 50%
21	29. had a functioning ECG machine	29. 20%
22 23	30. had nitroglycerine	30. 20%
23	31. had a defibrillator	31. 13%
	32. are well prepared to manage DKA	32. 33%
25	33. had a glucometer	33. 93%
26 27	34. had insulin	34. 80%
	35. provided some treatment for sepsis	35. 97%
28	36. had standardised clinical care guidelines	36. 0%
29 30	37. do not have a standardised approach to	37. 70%
31	trauma	
32	 had nitroglycerine and a functioning ECG // machine 	38. 20%
33	39. had a defibrillator	39. 13%
34	Number of Level 5 facilities that:	Percent of Level 5 facilities that had:
35	40. had chest tubes and X-ray capability	40. 100%
36	41. had splinting and casting supplies	41. 80%
37	42. had blood available for transfusion	42. 100%
38	43. gave oxygen to patients with suspected AMI	43. 100%
39	44. gave aspirin to patients with suspected AMI	44. 60%
40	45. gave morphine to patients with suspected	45. 40%
41	AMI 46. gave epinephrine to patients with suspected	
42	AMI	46. 20%
43	47. had vasopressor agents	47. 100%
44	48. had antibiotics	48. 100%
45	Number of Level 4 facilities that:	Percent of Level 4 facilities that had:
46	49. had chest tubes	49. 12%
47	50. had X-ray capability	50. 48%
48	51. had blood available for transfusion	51. 64%
49	52. refer someone presenting with a possible	F2 90%
50	acute myocardial infarction immediately	52. 80%
51	53. stabilize and then refer someone presenting	53 44%
52	with a possible acute myocardial infarction	53. 44%
53	54. provides diagnostic and treatment services	54 0004
54	without referral to someone presenting with a possible AMI	54. 30%
55	55. had vasopressor agents	55. 44%
56	56. had antibiotics	56. 92%
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2 316	Chunga (2019)	Percent of respondents that reported	Percent of respondents that reported
4		1. Access to a pre- hospital service in HIC	1. 4%
5		2. Access to a pre- hospital service in LMIC	2. 21%
6 7		3. Access to a national emergency number in HIC	3. 4%
3		 Access to a national emergency number in LMIC 	4. 21%
7	Comery (2020)	1. Lackof symptom awareness	1. Qual
0	,	2. Cost of transport to EC	2. Qual
1		3. EC Facility access to radiology	3. Qual
2		 EC facility access to laboratory 	4. Qual
3		5. Cost of EC	5. Qual
1		6. Cost of Medications	6. Qual
5			7. Qual
<u>à</u>	Coyle (2015)	7. Lack of staff Percent of hospitals with	Percent of hospitals with
3			·
))		1. adult triage training	1. 43%
)		2. pediatric triage training	2. 57%
		3. formal training in adult critical care	3. 86%
<u>2</u> 3		4. in-house acute care courses for continuing education	4. 14%
, I		5. a dedicated EC nurse	5. 71%
5		6. out-of-hours clinician cover	6. 71%
5		7. intravenous (IV) gentamicin	7. 100%
,		8. IV penicillin and quinine	8. 86%
}		9. Oral rehydration solution and IV fluids	9. 100%
)		10. insulin	10. 29%
)		11. equipment required to carry out IV procedures	11. 100%
1		12. oxygen concentrators or cylinders available	12. 43%
<u>}</u> }		in the EC 13. with light unsuitable for clinical examination	13. 57%
ł		14. a system in place to identify ward patients	14. 29%
5		whose clinical condition was deteriorating	
5		 guidelines for paediatric critical care guidelines for adult critical care 	15. 71% 16. 57%
		17. Emergency care guidelines for children	17. 57%
		5 7 5	
)		 Emergency care guidelines for adults Paediatric triage guidelines 	19. 43%
1			20. 29%
		 20. adult triage guidelines 21. guidelines for oxygen therapy 	18. 43% 19. 43% 20. 29% 21. 29%
2		22. facilities to check haemoglobin and blood	
3		glucose	22. 100%
Ι		23. ability to measure renal function	23. 71%
5		24. radiography	24. 57%
5		25. had a system in place for delaying regis-	
5		tration and payment until after the receipt of emergency treatment for critically unwell adults	25. 29%
)		26. had a system in place for delaying registration and payment until after the receipt of	26. 43%
) 		emergency treatment for critically unwell children	Dereent of public facilities with
		Percent of public facilities with	Percent of public facilities with
<u>)</u>		27. adult triage training	27. 0
3		28. pediatric triage training	28. 2
ł -		Percent of private facilities with	Percent of private facilities with
5		29. resuscitation facilities for adults	29. 100%
5		30. all of the six infrastructure indicators	30. 100%
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2 3		31. all 23 indicator drugs and all 34 equipment
4		indicators 31. 100%
5		For public facilities, average number of For public facilities, average number of
6		32. infrastructure indicators 32. 1
7		33. drug indicators 33. 16/21
8		34. equipment indicators 34. 21/34
9		Percent of district hospital with Percent of district hospital with
10		35. access to x-ray facilities 35. 0
11		36. emergency blood transfusion 36. 0
1 <mark>2</mark> 13	De Wulf (2017)	1. The inability to pay for transportation or medications, laboratory investigations, and radiography
13		2. Health system issues 2. Limited bed capacity
15	De Wulf (2015)	Percent of hospitals with Percent of hospitals with
16		1. emergency care area beds 1. 67%
17		2. Supervisory level physicians consistently available during the entire 24 hours 2. 67%
18		3. with potable water 3. 0%
19 20		4. a list of emergency equipment 4. 67%
20		5 emergency equipment was available
21		intermittently 5. 100%
22		6. no formal training of staff for the use of this 6. 100%
23		7. surgical services and dental care 7. 67%
24		8. critical care or ophthalmological services 8. 0%
25		9 a protocol for the transfer of patients
26		requiring a higher level of care 9. 33%
27		Percent of clinics with Percent of clinics with
28		10. electricity 10. 20%
29		11. a list of emergency equipment 11. 0%
30 31		12. basic equipment to manage obstetrical 12. 0%
32		13. pulse oximetry and glucometers 13. 20%
33		14. stethoscopes 14. 60%
34		15. HIV care 15. 0%
35		16. cholera and tuberculosis care 16. 60%
36		17 a protocol for the transfer of patients
37		requiring a higher level of care
38		Percent of health facilities with Percent of health facilities with
39		18. respiratory isolation area 18. 0%
40		19. maintenance of records for patients seen in 19. 100%
41		20. existence of an additional staffing resource
42		list to be used in event of disaster or emergency 20. 13%
43		situations
44		21. access to an ambulance for interfacility 21. 13%
45		22. Use of a protocol or phones for the transfer of $22 0\%$
46		patient 23. Hospitals had increased access to equipment, materials, and
47 48		23. Resource issues medications compared to community clinics. No computed tomography existed in the region.
49 50		24. Geographic barriers 24. Some of the health centers required multiple modes of transportation, not being passable consistently by 4-wheeled vehicles.
51 52		25. Referral issues 25. Patients were referred to the closest hospital, regardless of whether that facility had the capability to handle the case.
52 53	El Tayeb (2015)	1. Demographics likely to use formal services 1. Males were almost twice as likely as females
54		2. Financial barriers 2. Affordability of the formal health service
55		2. Anordability of the formal health service 3. Geographic barriers 3. Distance
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condition as severe and sought health care in the formal system1.57.4%2.Percent of individuals who perceived their condition as non-severe and sought health care in the formal system2.36.2%3.Demographics associated with increased seeking of formal health care3.Geographic location less than 30 minuter household head having a secondary school ed under 15, and having health insurance4.4.Percent of individuals who received medicines free of charge5.Financial barriers5.Financial barriers5.Financial barriersashtarkhani 10200)1.Calculated accessibility by 2SFCA method odkinson (2020)1.Calculated accessibility by 2SFCA method seeking care3.Dercent of heopile reporting wait times at facilities as a barrier to seeking care1.Concerns over personal safety3.Percent of people reporting financial barriers3.Fercent of hospitals1.Concerns over personal safety3.Percent of people reporting wait times at facilities as a barrier to seeking care3.Fercent of hospitals1.7.8% in Tanzania3.had equipment at their facility3.had adequate monitoring of medication inventory3.1.4% in health centres and 18% in hospita4.Vith capacity to provide 24-hour emergency care6.With basic infrastructure7.7% to 35% of facilities.5.With capacity to provide 24-hour emergency care7.With adequate infractity2.4.4% in Tanzania5.With capacity to their1	
3. Geographic barriers 3. Few citizens reside where services exist 4. Pre-hospital issues 3. Single emergency response number is in sinancial barriers 5. Financial barriers 3. Demographic bases who perceived their condition as severe and sought health care in the formal system 5. Formal system 3. Demographics associated with increased seeking of formal health care 1. 57.4% 3. Demographics associated with increased seeking of formal health care 2. 36.2% 4. Percent of individuals who perceived their condition as non-severe and sought health care in the formal system 2. 36.2% 3. Demographic barriers 3. Geographic location less than 30 minuter household head having a secondary school ed under 15, and having health neurance 4. Percent of individuals who received medicines free of charge 5. Financial barriers 5. Financial barriers 6. Financial barriers 2020) 1. Calculated accessibility by 2SFCA method 1. Ocncerns over personal safety 2. 23.1% 3. Percent of people reporting financial barriers 3. 5.1% 4. Pre-hospital issues 2. 36.2% 9. Percent of people reporting financial barriers 3. 5.1% 1. on tequipped with basic building resources 1. 78% in Tanzania 1. not equipped with basic building resources 1. 78% in Tanzania <t< td=""><td>ders, dispatchers, or</td></t<>	ders, dispatchers, or
4. Pre-hospital issues 4. Single emergency response number is m 5. Financial barriers 5. ambulances are paid either by cash on a via an insurance option imerick (2013) 1. Percent of individuals who perceived their condition as severe and sought health care in the formal system 1. 57.4% 3. Demographics associated with increased seeking of formal health care 1. 57.4% 4. Percent of individuals who received medicines free of charge 2. 36.2% 5. Financial barriers 3. Geographic location less than 30 minuter household head having a secondary school ed medicines free of charge 5. Financial barriers 3. Deroent of individuals who received medicines free of charge 5. Financial barriers 3. Deroent of people reporting financial barriers 4ashtarkhani 1. Calculated accessibility by 2SFCA method facility in the city center is low compared accessibility in the city center is low compared facilities as a barrier to seeking care 1. Concerns over personal safety 2. Percent of people reporting financial barriers 3. 5.1% 4. EMS delays 4 with adequipment and staff who could competently ulize the equipment at their facility as in frastructure 3. Mad adequiate infection control materials 5. Were than half 5. with capacity to provide 24-hour emergency care 6. with basic infrastructure component such as water and electricity 7. With Masof facilitites. 6. wi	
5. Financial barriers 5. ambulances are paid either by cash on a via an insurance option Emerick (2013) 1. Percent of individuals who perceived their condition as non-severe and sought health care in the formal system 5. Financial barriers 1. 57.4% 3. Demographics associated with increased seeking of formal health care 3. Geographic location less than 30 minuter to usehold head having a secondary school working health insurance 4. Percent of individuals who received medicines free of charge 5. Financial barriers 5. Financial barriers 3. Geographic location less than 30 minuter to usehold head having a secondary school working head the ving head the	st
 Financial duriners Via an insurance option Setting of ormal system Percent of individuals who perceived their condition as non-severe and sought health care in the formal system Demographics associated with increased seeking of ormal health care Percent of individuals who received medicines free of charge Financial barriers Financial barriers Financial barriers Financial barriers Calculated accessibility by 2SFCA method Calculated accessibility by 2SFCA method Calculated accessibility and thours at facilities as a barrier to seeking care Percent of people reporting mait times at facilities as a barrier to seeking care Percent of hospitals not equipped with basic building resources Nad equipment and staff who could competently utilize the equipment at their facility had equipment and staff who could competently utilize the equipment at their facility had adequate infection control materials with acpacity to provide 24-hour emergency care With basic infrastructure With basic infrastruct	not well publicized
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 2. Had adjust with a dequate monitoring of medication inventory 4. with adequate infection control materials 5. with capacity to provide 24-hour emergency care 6. with basic infrastructure components such as water and electricity Percent of clinics 7. with basic infrastructure 7. with basic infrastructure 7. with basic infrastructure 7. with basic infrastructure 8. less than 65% Percent of clinics 7. with basic infrastructure 8. less than 65% Percent of clinics 7. with basic infrastructure 7. T% to 35% of facilities. Fee associated with 1. hospital ambulance 2. KHR45 000 (\$6.25) 2. Ambulance referrals to the provincial hospital 3. transport by tuk-tuk 4. overall fee associated with transport 5. Pre-hospital system issues 6. Percent of people transported to health facility using their own means of transport 6. Percent of individuals who report the health system was too far 7. 9% 	
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facility using their own means of transport 6. 32% 7. Percent of individuals who report the health system was too far	ntact number of the
system was too far	
9 Training issues 9 Four health district staff reasined training	
	ng in emergency medicine
 Percent of health centre staff members who were insufficiently qualified to successfully deal 59% with the condition 	
Khan (2003) 1. Neither the ambulance driver nor the number of certification in advanced life support.	urse has any formal train
2. Equipment issues 2. Ambulances lack advanced cardiac life s	support equipment

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	3. Health system issues	There is no physical location for advanced pediatric care or pediatric resuscitation.
	4. Pre-hospital issues	4. An organized emergency medical response system does not ex no emergency number
Khan (2010)	 Mean time from occurrence of injury to arrival in the ER 	1. 4.7 h
	 Range of time from occurrence of injury to arrival in the ER 	2. Range 0.8–48 h
	3. Patients who arrived in the ER after 1 hour of	3. 675 (69%)
	injury 4. Patients who reached the ER within 1 hour of	
Kirsch (1995)	injury Percent of physicians who	Percent of physicians who
	1. had taken an Advanced Trauma Life Support course	1. 30%
	2. had taken an Advanced Cardiac Life Support course or Advanced Pediatric Life Support training	2. 0%
	Percent of physicians how believed they could adequately perform	Percent of physicians who believed they could perform
	3. intubation	3. 18%
	4. tube thoracostomy	4. 15%
	5. venous cutdown	5. 15%
	6. tracheostomy	6. 5%
	7. Staffing issues	 Nursing shortages reported in emergency departments. Trained staff were not available during many nights or weekends. IV line supplies, backboards, or cervical collars are not carried in ambulance
	8. Resource issues	 supplies, backboards, or cervical collars are not carried in ambulance 8. Specialized blood tests are not easily obtained. Limited supplies banked blood. Limited availability of CT, ultrasound, and MRI.
	9. Health system issues	 Lengthy delays in response from consulting specialities. Legal restrictions prevent ambulance drivers from starting IV lines or giving medication.
	10. Communication issues.	10. The EDs do not have radios.
Kumar (2009)	1. Pre-hospital system issues	1. Trained personnel as first responders were unavailable and pre- hospital care was lacking
Levine (2007)	 Percent of patients that have access to motorized transport Percent of providers that 	1. 20%
	 reported that their patients had to travel more than 10 km for surgical or obstetric services 	2. 62.5%
	3. had access to blood smears for malaria	3. Less than half
	 lacked access to any laboratory diagnostic equipment 	4. 44%
	5. could offer blood transfusions	4. 44% 5. 0%
	6. felt comfortable diagnosing the 7 emergency conditions assessed	6. 63%
	 felt comfortable diagnosing femur fracture or pneumonia 	7. 56%
	8. felt comfortable diagnosing obstructed labor	8. 75%
	9. felt comfortable treating the 7 emergency conditions assessed	9. 19%
	10. felt comfortable treating obstructed labor	10. 0%
	11. felt comfortable treating gastroenteritis	11. 64%
Luo (2020)	1. Standardized E-2SFCA access scores	1. 75% of shequs having a value lower than 0.4 for single trip and 0.8 for the total trip.
	 Percent of shequs can be reached by an ambulance from the nearest EMS stations within 10 min 	2. Over 50% and again a patient can be transported from his/ her shequ to the nearest hospital within 9 min.
Macharia (2009)	 Health facilities demanded cash deposits or letters of guarantee of payment before providing treatment to road traffic injury patients 	1. 14.6%
	acament to road tranic injury patients	

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13 14 15 16 17 18 19 20 21 22	Mahm
23 24 25 26 27 28 29 30 31 32 33	Mathe
34 35 36 37 38 39 40 41 42 43 44	Mock
45 46 47 38 48 49 50	Mock
51 52 53 54 39 56 57 58 59 60	Mock

1

	3. Percent of health facilities that rated themselves as being well prepared to handle road traffic crash emergencies	3. 40.8%
	Percent of respondents that	Percent of respondents that
	4. owed the hospitals more than of US \$ 133.	4. 22.3%
	5. were in a position to pay the bills	5. 19.7%
	would approach relatives and friends for financial assistance	6. 58.7%
	were transported to hospital by unknown persons	7. 19.7%
	8. were transported to hospital by persons who were previously known to them	8. 76.5%
	9. received any form of first aid at the crash site	9. 16.0%
	10. received first aid from members of the public, other motorists or the less injured casualties	 7. 19.7% 8. 76.5% 9. 16.0% 10. 74.0% Percent of cases in which the ambulance response time was 1. 60% 2. 30% 3. 10% Percent of cases in which the time from the site to the hospital was
mood (2010)	Percent of cases in which the ambulance response time was	Percent of cases in which the ambulance response time was
	1. less than 10 minutes	1. 60%
	2. 15-20 minutes	2. 30%
	3. 30-45 minutes	3. 10%
	Percent of cases in which the time from the site to the hospital was	
	4. 5 minutes	4. 32%
	5. 10-15 minutes	5. 48%
	6. 20-30 minutes	6. 20%
new (2017)	Percent of districts that	Percent of districts that
	1. had more than 80% of the population residing within half-an-hour travel distance of a PCI-capable hospital	5. 48% 50 6. 20% 50 Percent of districts that 50 1. 36% 50
	2. had more than 90% population having timely (within 1h) access to some mode of reperfusion therapy for STEMI, either thrombolysis and/or primary PCI	 2. 57% Percent of the population 3. 69.84% 4. 21.87%
	Percent of the population	Percent of the population
	3. residing within half-an-hour travel distance from a PCI-capable hospital	3. 69.84%
	 had access to a thrombolysis-capable hospital within 1h travel time 	4. 21.87%
	5. would have had to travel more than an hour to access a reperfusion-capable hospital	5. 8.28%
k (1997)	Percent of respondents reporting	Percent of respondents reporting
	1. distance to treatment is too far	1. 8%
		2. 37%
	 preferences for other treatments Types of injuries more likely to receive formal medical care 	 3. Head or torso injuries, transportation related injuries and assaults g
	4. Use of formal medical services for persons aged less than 20 years	4. 54%
	5. Use of formal medical services for persons aged more than 20 years	 5. 61% Percent of survey respondents reporting barriers to care: 1. 20%
k (2001)	Percent of survey respondents reporting barriers to care:	Percent of survey respondents reporting barriers to care:
	1. preference for other treatments	1. 20%
	2. financial	2. 53%
	 health care utilization when health care was available in the user's town 	3. 59%
	 health care utilization when health care was not available in the user's town 	4. 41%
k (2006)	1. Training issues	1. Lack of training for trauma care, including in-service training for doctors, lack of training to use equipment

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mited. Difficulties in the tests, imaging, oxygen, entilators, prostheses fo ement programs.	BMJ Open: first published
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2			
3 4		2. Staffing issues	 Lack of surgical coverage. Resources for acute resuscitation were limited. Difficulties in the
5 6		3. Resources issues	procurement process exist. Lack of laboratory tests, imaging, oxygen, fluids, chest tube equipment, pulse oximetry, ventilators, prostheses for amputees, medications.
7		4. Health system issues	 Lack of trauma registry or quality improvement programs.
840 9	Mohan (2018)	1. Demographics associated with significant pre-hospital delay	1. Elderly, rural, and illiterate populations
10		2. Barriers to seeking care	2. Recognizing symptoms as cardiac in origin
11		3. Percent of hospitals with ECG availability	3. 96.4%
12		4. Percent of outpatient facilities with ECG	4. 83%
13		availability Percent of patients	Percent of patients
14		5. to whom a hospital was the nearest medical	
15		aid	5. 54.8%
16		6. to whom a clinic was the nearest medical aid	6. 45.2%
17		 presented with more than 6 hours of prehospital delay 	7. 42%
148	Mould-Millman	Development of:	Development of:
19	(2015)	1. Tiers of Providers	1. Minimally developed
20	Assessment of Emergency	2. Recruitment and Retention of providers	2. Mostly developed
21	Medical Services	3. Continuing Education	3. Minimally developed
22	in the Ashanti	4. Initial Education	4. Partially developed
23	Region of Ghana.	5. Team Training	5. Partially developed
24		6. Equipment and Medication	6. Mostly developed
25		7. Toll-free Number	7. Moderately developed
26 27		8. Call processing and dispatch	8. Partially developed
27 28		9. Primary Transportation and Inter-facility	9. Mostly developed
29		10. Communication	10. Partially developed
30		11. Community Integration	11. Minimally developed
31		12. Healthcare System Integration	12. Partially developed
32		13. EMS Legislature, Rules and Regulation	13. Mostly developed
33		14. Sustainable Resources	14. Mostly developed
34		15. Public Knowledge	15. Minimally developed
35		16. Quality Assurance and	16. Minimally developed
36	Mould-Millman	Percent of survey respondents that:	Percent of survey respondents that believed that:
37	(2015) Accessing Emergency	1. believe EMTs offer high-quality care	1. 54.7%
38	Medical Services	2. believe it is "better" to go by ambulance	2. 86.1%
39	in Accra, Ghana:	3. believe taxis are faster than ambulances in	3. 78.0%
40	Development of a Survey	Accra 4. believe government ambulances were free or	4 52.00/
41	Instrument and	affordable	4. 53.2%
42	Initial Application in Ghana.	5. believe private ambulances were too expensive	5. 50.2%
43	in Onana.	6. knew the existence of a public access	
44		medical emergency telephone number	6. 43.8%
45		7. knew that the emergency number was a toll-	7. 37.1%
46 47		free call	
47 48		8. would be more likely to call the emergency number if they knew the call was	8. 35.7%
49		toll free	9. 45.5%
50		9. knew about the government ambulance	10. 35.3%
51		service 10. indicated it would take a government	
52		ambulance 15 minutes or less to arrive at the	11. 6.8%
53		location	
54		11. indicated it would take 60 minutes or more	
54 <u>3</u>		Dercent of exetems that utilized:	Percent of systems that utilized:
56		Percent of systems that utilized:	Percent of systems that utilized:
57			
50			

2 3			
4		1. tier-one (layperson responders trained in first aid)	1. 48%
5		2. tier-two (professional or medically-trained)	2. 96.0%
6		3. Basic emergency medical technicians	3. 84%
7		(EMTs)	
8		 advanced providers more often basic providers more often 	4. 60% 5. 84%
9		6. prehospital nurses	6. 28%
10		 prenospital nurses used only advanced providers 	
11		8. EMS physicians	8. 40%
12		9. quality assurance programs	9. 44%
13		10. research	10. 12%
14		11. Basic Life Support - capable vehicles	11. 84%
15		12. Advanced Life Support -capable vehicles	12. 68%
16		13. vehicles posted at ambulance stations	13. 72%
17	Mould-Millman (2017)	14. vehicles posted at health care facilities	14. 56%
18	(2017)	15. motorcycle ambulances	15. 12%
19		16. fixed wing air transport	16. 32%
20		17. rotary wing (helicopter) ambulances	17. 32%
21		18. water-craft	18. 12%
22		19. Total number of EMS systems identified	19. 25
23		Percent of countries in which	-
24		20. EMS systems existed in Africa	20. 29.6%
25		21. EMS systems existed in West Africa	21. 12.5%
26		22. no EMS systems existed	22. 9.3%
27		23. the questionnaire was not returned	23. 51.8%
28 29		24. some form of regulations governing EMS or ambulance operations existed	7. 4% 8. 40% 9. 44% 10. 12% 11. 84% 12. 68% 13. 72% 14. 56% 15. 12% 16. 32% 17. 32% 18. 12% 19. 25 20. 29.6% 21. 12.5% 22. 9.3% 23. 51.8% 24. 100% 25. 26%
30 31		25. an established toll-free emergency telephone number existed	25. 26%
32	Nagata (2011)	Median direct distances between injury sites and the trauma centers were	Median direct distances between injury sites and the trauma centers
33			
34		1. Viet Duc Hospital	1. 5.65 (3.19 - 8.64) km 2. 5.31 (2.89 - 8.54) km 3. 5.11 (3.11 - 8.72) km 1. 80% 2. 55.6%
35		 Bach Mai Hospital Saint Paul Hospital 	2. 5.31 (2.89 - 8.54) km
36 3 7	Natuzzi (2011)	 Same Faul Hospital Percent facilities with running water 	3. 5.11 (3.11 - 8.72) km
		2. Percent facilities with electricity without	
38		outages	2. 55.6%
39 40		 Percent of facilities with consistent oxygen source 	3. 88.9%
49	Nielsen (2012)	1. Access to emergency care services within 1	1. 100 percent in Urban Brazil, Colombia, and Maharashtra State to
42		hour	
43		2. To whom advanced life support capabilities	2. A significant number of persons in two of the upper middle income
44		during transport was available	sites
45 46		 To whom basic life support capabilities during transport was available 	 very low in Kenya, Pakistan, Sri Lanka, and Vietnam A significant number of persons in two of the upper middle income sites More than half of people only in South Africa and Gujarat State, India. Varying levels of training of providers, including no emergency medicine training Lack of medicines 45%
40		4. Training issues	4. Varying levels of training of providers, including no emergency
48	Ntabaye (1998)		medicine training
49	Nabaye (1990)		1. Lack of medicines
50		2. Percent of respondents who did not have the ability to pay for health services	2. 45%
51			3. Fare for transportation
		3. Financial barriers	
52 53		 Financial barriers Demographics more likely to seek care 	4. Those who had a higher number of missing teeth, were educated and aged more than 40 years
52 53 54			and aged more than 40 years
52 53 54 55		4. Demographics more likely to seek care	o o i
52 53 54 55 56		 Demographics more likely to seek care Percent of respondents who indicated fear 	and aged more than 40 years
52 53 54 55 56 57		 Demographics more likely to seek care Percent of respondents who indicated fear 	and aged more than 40 years
52 53 54 55 56 57 58		 Demographics more likely to seek care Percent of respondents who indicated fear 	and aged more than 40 years
52 53 54 55 56 57		 Demographics more likely to seek care Percent of respondents who indicated fear 	and aged more than 40 years 5. 6.5%

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1			
2 348	Quima (2018)		
4	Ouma (2018)	 Percent of people living within 2-hour travel time of the nearest public hospital 	1. 71%
5 6 7		2. Percent of women of child bearing age living within 2-hour travel time of the nearest public hospital	2. 71.8%
8		 Percent of people living more than 2-hour travel time of the nearest public hospital 	3. 29%
9 10		4. Percent of women of child bearing age living more than 2-hour travel time of the nearest public	4. 28·2% 모
11 12		hospital 5. Percent of the population within 2-hour travel	 28·2% Less than 25% in South Sudan to more than 90% in Nigeria, Kenya, Cape Verde, Swaziland, South Africa, Burundi, Comoros, São Tomé and Príncipe, and Zanzibar
13 14		time of a public hospital 6. Countries with less than 50% of the	Kenya, Cape Verde, Swaziland, South Africa, Burundi, Comoros, São Tomé and Príncipe, and Zanzibar.
15		population within 2-hour travel time of a public emergency care hospital	6. South Sudan, Mauritania, Eritrea, Niger, Sudan, Madagascar, and Chad.
16 17 18		7. Countries with more than 90% of their respective population living within 2-hour travel time of a hospital	 Kenya, Cape Verde, Swaziland, South Africa, Burundi, Comoros, São Tomé and Príncipe, and Zanzibar. South Sudan, Mauritania, Eritrea, Niger, Sudan, Madagascar, and Chad. Nigeria, Kenya, and South Africa 16 5.4% report none 4.1 report none 17.6% report none or limited 39.3% report none or limited 11.6% 13.9% report no system 13.9% report no system 13.9% report no system 15.4% report no system 16.7
19 20		 Number of countries with more than 80% of the population within 2-hour travel time of a hospital 	8. 16
<u>2</u> 49	Phillips (2020)	1. Percent with EC training	1. 5.4% report none
22		2. Purpose built EU with resus	2. 4.1 report none
23		3. EU overcrowding	3. 17.6% report none
24 25		Ŭ N	4 19.4% report none or limited
26		4. EU specific equipment	4. 18.4% report none or limited
27		5. Presence and use of triage	5. 39.3% report none or limited
28		6. Use of EU guidleine	6. 11.6% ត
29 30		7. Presence of System for access to EC and first aid from trained first responders	7. 13.9% report no system
31		8. Presence of system to provide EC during	
32		transport between scene and facility, or between facilities	8. 13.9% report no system
33		9. System to access EC from trained first	
34 35		responders and the scene and urgent transport to a health facility (overall system of pre-hospital care)	9. 19.0% report no system
36	Pigoga (2020)		1. Training related to critical trauma and airway interventions, and
37		1. Training issues	neonatal care; issues with treating malnutrition or severe anaemia; inability to perform the following procedures: intraosseous access or
38 39			venous cutdown, apply three-way dressings for sucking chest wounds or perform fasciotomies or escharotomies
40		2. Health system issues	2. Only one facility with a dedicated resuscitation area
41			, , , , , , , , , , , , , , , , , , ,
42 43			3. Lack of medications, equipment, and tests, including: pulse oximetry, airway management, needle thoracostomy, chest tube, pelvice binders, ECG, ultrasound, thrombolytics, blood transfusion, defibrillation, cardioversion, pericardiocentesis, external cardiac pacing procedural sedation, IV antibiotics, IV vasopressors, uterotonic drugs
44		3. Resource issues	binders, ECG, ultrasound, thrombolytics, blood transfusion,
45			procedural sedation, IV antibiotics, IV vasopressors, uterotonic drugs
46			
47		4. Quality issues	4. Lack of: clinical protocols, protocols for communicating critical labor results for infection control infection, triage
48 49	Radjou (2013)	1. Mean distance and time travelled by direct group	 4. Lack of: clinical protocols, protocols for communicating critical labor results for infection control infection, triage 1. 31.4 km, 90 min
50 51		 Mean distance and time travelled by referred group 	2. 52.81 km, 279 min
52		 Percent of referred cases that clocked unnecessary distance to reach care 	3. 54%
53 54		 Percent of direct cases that clocked 	
54 55		unnecessary distance to reach care	4. 14.2%
56			
57			
58			
50			

					B
1					N N
2					Ope
3 4		 Median unnecessary distance clocked by referred cases to reach care 	5.	24.49 km	BMJ Open: first published as 10.1136/bmjopen-2022-067884 on 17 Protected by copyright, including for
5 6		Median unnecessary distance clocked by direct cases to reach care	6.	10.86 km	st pub
752 8	Razzak (2001)	1. Training issues	1. care	No ambulance driver had formal training in first aid or prehospital	, olish
8 9		 Percent of ambulance services that carry only a stretcher 	2.	71%	ed a
10 11		 Cost of transport for non-air-conditioned ambulances 	3.	Pakistani rupee (PR) 7–10 (\$0.12–0.17) per mile	s 10. Pro
12		4. Cost of transport for air-conditioned	4.	PR 15–20 (\$0.26–0.35) per mile	.113 otec
13		ambulances 5. Percent of ambulance services that operate	5.	8%	6/br
14		only during day hours Percent of patients that said		ent of patients that said	njo by c
15 16		6. the streets in their area were too narrow for		3%	pen
10		an ambulance	6.		-20 yrig
18		 they did not use ambulances due to high cost they preferred using taxis or cars due to easy 	7.	8%	22-(ht,
19		access	8.	38%	067 inc
20 21		9. the patient was not sick enough to call an ambulance	9.	26%	884 Iudir
22		10. they used a taxi because the patient was too sick to wait for anything else	10.	20%	10.1136/bmjopen-2022-067884 on 17 April 2023. Downloa Enseignement Sup Protected by copyright, including for uses related to text
23 24		11. patient was sick enough to come to the ED	11.	45%	
24 25		12. they did not come to the ED because of the slow response of the ambulance service	12.	23%	April 2023. Enseigne uses relate
26		13. they did not come to the ED because they			2023. Dow eignement related to
27 28		did not know how to find one	13.	11%	ed to
29		14. they would call an ambulance only if they are unable to walk	14.	44%	o tex
30 31		15. they would call an ambulance only if they were very sick or near death	15.	22%	Downloaded from ment Superieur (d to text and da
32		16. they were not sure when to call an	16.	21%	id from ieur (A d data
33		ambulance 17. they knew of at least one ambulance service	17.	57%	ta ́ ∕> ≍
34		18. they knew of two ambulance services	18.	21%	h <mark>ttp://</mark> BES) . mining
35		19. they did not know of any ambulance service	19.		ing
36 37		20. knew the phone number of any ambulance	20.	0%	• O
38	Ro (2017)	service	Dore	ant of rependents that reported the primary response for not	jop I tra
39		Percent of respondents that reported the primary reasons for not seeking health care were:	seek	 14% 0% ent of respondents that reported the primary reasons for not ing health care were: 37.2% 22.2% 8.7% 5.7% 4.6% People whose mean income was below moderate levels, those lived far from a teaching hospital or close to a district hospital Paraná, Goiás, Minas Gerais, Bahia, Piauí, Rio Grande do Norte rá e Pernambuco 	mjopen.bmj.com/ on June 11, 2025 at Agence Bibliographique de l Al training, and similar technologies.
40 41		1. financial	1.	37.2%	j, nj.o
41		 use of complementary medicine the that condition was not severe enough to 	2.	22.2%	nd
43		visit hospital	3.	8.7%	v o sim
44		4. limited accessibility to hospital	4.	5.7%	n ا
45		5. social and family disapproval	5.	4.6%	r te
46		6. Those who were more likely to experience	6.	People whose mean income was below moderate levels, those	≎11
47 54 48	Rocha	unmet needs in the previous year	who	lived far from a teaching hospital or close to a district hospital	, 2(10(
	(2017)Addressing	1. States with high levels of accessibility	1. Cea	Paraná, Goiás, Minas Gerais, Bahia, Piauí, Rio Grande do Norte rá e Pernambuco	025 ogi
49	geographic	2. Number of municipalities that had high	000		es. at
50	access barriers to emergency care	accessibility to small hospitals and low to high	2.	1595	Ag
51 52	services: a	complexity center 3. Percentage of municipalities with below			enc
52 53	National ecologic study of hospitals	average access to high complexity center that	3.	74%	ё П
55	in Brazil.	were covered by small hospitals			libl
55		4. Number of municipalities that did not meet the criteria of maximum travel time of 2 hours	4.	824	iog
56					rap
57					hic
58					lue
59					de
60		For peer review only - http://bmjopen.bm	nj.con	n/site/about/guidelines.xhtml	-

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5	Rocha (2017)	1. Percentage of small hospitals that were in		
	Access to emergency care services: a	municipalities that had also high complexity centers 2. Percentage of municipalities were located	1.	26% of small hospitals
	transversal ecological study	within less than 60 km from the closest city with a high complexity center with an adult ICU	2.	63%
	about Brazilian emergency health care	3. Number of people that were at least 120 km away from a high complexity center with an adult ICU	3.	14 million
) I	network.	 Percent of the population who were more than 120 km away from a health facility with a neonatal ICU 	4.	12% Prot
8	Roy (2010)	1. Training issues	1.	Lack of training of ambulance attendants
		2. Equipment issues	2.	No resuscitation equipment in the ambulance
1 5		Odds ratio of likelihood the following groups would receive prehospital care:	Odd care	12% Lack of training of ambulance attendants No resuscitation equipment in the ambulance Is ratio of likelihood the following groups would receive prehospital 2.3 10.83 0.54 0.1 Lack of laboratory testing
5		3. road traffic accident victims	3.	2.3 Y
/		4. arriving by government ambulance	4.	10.83 G
3		5. arriving by taxi	5.	0.54
))		6. being transferred from other medical facilities for "medico-legal reasons"	6.	0.1 O.1
7	Scolari (2018)	1. Resource issues	1.	
<u>2</u> 3		2. Acceptability issues	2.	Conduct of health professional does not meet the expectations of of
5 4		3. Health systems issues	the j 3.	patients Contraction and bed limitations
5		4. Geographic barriers	4.	Geographic relationship to care
5 5 7	Sheikhbardsiri (2020)	1. Mean of patient's rights observed	1.	130.3 (SD: 40.1)
9)	Siddiqui (2008)	1. Mean distance from the residence to the hospital	1.	Hours of operation and bed limitationsSees relatedGeographic relationship to care130.3 (SD: 40.1)56.75km±123km.56.75km±123km.63 %86.5%60.6%12.7%28%32%
)		Percent of patients who		xt.
 <u>2</u>		 came late who were referred presented within 60 minutes of onset of symptoms 	2. 3.	63 % and a second secon
3 1		 were first taken to another hospital mainly cardiac hospital and then referred here 	4.	60.6%
5		 first opted for alternative medicines thought stroke symptoms would resolve 	5. c	12.7%
7		spontaneously	6.	28% ≥
3		7. did not know a single symptom of stroke	7.	32% Ta
Ð		 knew at least one stroke symptom hemiplegia was the most familiar stroke 	8.	10.9%
)		symptom	9.	67% Ģ
1 2		10. speech disturbance was the most familiar stroke symptom	10.	61% A
3 1	Cadamaan	11. Median time from onset of symptoms and contact with general practitioner	11.	30 minutes
4 5 5	Sodemann (2006)	 Odds ratio associated with mortality risk within 30 days of first consultation for those acquainted with a medical doctor 	1.	10.9% 10.9% 67% 61% 30 minutes 10.55 Mothers belonging to Muslim ethnic groups 5%
7		Those whom were less likely to present a severely ill child	2.	Mothers belonging to Muslim ethnic groups
3	Sohayla (2020)	1. Accessed EC in last 12 months	1.	5% 9
9		2. Aware of EC services	2.	Very good: 67.7%
2 2	Stein (2016)	1. Pre-hospital issues		Lack of a single toll-free emergency number, knowledge of the ergency number, available community first responders, 24-hour EMS lability,
		2. Acceptability issues	2.	Acceptability of EMS to the community
3 3 7 5	Sultan (2019)	1. Factors associated with increased likelihood of ambulance use	1.	Amharic speaking, previous ambulance use
5 5 7				

1 2 3 4 5	
6 764 8	Suriyawongpaisal (2018)
9 የð	Suriyawongpaisal (2016)
11 19 9 13	Tansley (2015)
14 15 867 17 18 19 20	Tansley (2016)
21 22 23 24 25 26	
27 28 29 30 31 32 33 34	
36 36 37 38 39 40 41 42	Thomson (2005)
43 44	T
<u>ቆ</u> 9 46 <i>ፈን</i>	Treleaven (2017) Vanderschuren (2015)
48 49 50 51	Wen (2011)
52 53 54	
55 56 57	
57 58 59 60	
1	

				7
2. use a	Odds ratio associated with the ambulance and police as a patient companion	2.	1.53	
3.	Pre-hospital issues	3. ambi	Long arrival time for ambulance, not enough distribution of ulance stations, and difficulty of accessing the phone	
1.	Financial barriers	1.	Preauthorization	
2. barri	Demographics associated with financial ers	2.	Females were less likely to have preauthorization	
1.	Financial barriers	1.	Copayment	Prot
1. trave	Percent of the population within 50km of road I distance to tertiary care	1.	28%	ected
	Proportion of a region's population within a m service area of a Level C facility	2. Haiti depa	Copayment 28% 0% in the more remote regions to 95.4% in the most Urban regio , 0% in the Nord Ouest department to 89.1% in the Ouest artment 8.7 to 59.4% 37% to 79% 26% to 61% 0.05 in the Obuasi Municipal District to 2.4 in the Sissala West ict ent of facilities in Namibia found to be capable of providing level: 12.4% 7.3% 1.2% 88%	ру сор
Amb	Proportion of Ghana's landmass that is ceable within 60-minutes of an National ulance Service station (from 2004 to 2014)	1.	8.7 to 59.4%	yright,
2004	Proportion of the population within a 60- te catchment area of a N/AS station (from to 2014)	2.	37% to 79%	includ
3. area	Population within a 30-minute catchment of a N/AS station	3.	26% to 61%	ling
4.	Ambulances per 100,000	4. Distr	0.05 in the Obuasi Municipal District to 2.4 in the Sissala West ict	y for u
	ent of facilities in Namibia found to be capable oviding care level:	Perc	ent of facilities in Namibia found to be capable of providing level:	Enseignement Ises related to
5.	A	5.	12.4%	elat
6.	В	6.	7.3%	em
7.	C	7.	1.2%	to ent
	X (unsuitable for providing emergency care) ent of facilities in Haiti found to be capable of iding care level:		88% ent of facilities in Haiti found to be capable of providing care level	Superie text and
9.	A	9.	18.9%	
10.	В	10.	1.7%	ur (A data
11.	С	11.	0.9%	
12.	Х	12.	81.1%	ni E
1.	Health system issue	•	Rural, district and small Urban hospitals have no emergency artment	ng, A
2.	Training issue	2.	No emergency medicine training	- -
3. ⊿	Staffing issue	3. ⊿	EDs are staffed by only one doctor	ain
4. 5.	Resource issues Financial barriers	4. 5.	Lack of CT availability after hours Patients must pay cash for any imaging	ing
5.		5.	Fallents must pay cash for any imaging	ц а
6.	Pre-hospital system issues	cellu	Ambulances have to travel up to 200 miles, lack of helicopters, the ambulance services have tried to link their control rooms to lar networks, which has delayed response to major accidents and ents by the responsible authorities, lack of dispatchers	BES) . mining, Al training, and similar technologies.
1. outco	Demographics that demonstrated worse omes	1. anoti	Poorer, younger, rural, and children who were referred from her facility children	· techi
	Percent of fatalities that were outside of the en Hour	1.	53.1%	nolog
2.	Fatality rate within the service areas	2.	2.25 fatalities/km	ies
3.	Fatality rate within the service gaps	3.	2.91 latailles/km	
1.	Financial barriers	1.	Payment is requested at the time of care	Ű
	Percent of individuals who were prevented receiving treatment due to lack of payment	2.	one-third	
3.	Pre-hospital system issues	3.	Lack of prehospital care	
4.	Geographic barriers	4.	Hours of travel are required in remote areas	
5.	Resource issues	5.	Lack of resources, including electricity and equipment	

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g, ahd similar technologies.		com/ on June 11, 2025 at Agence Bibliographique de l

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2			
3 4 5 6		6. Training issues	6. No emergency medicine training, one hospital provided specialised training at the basic life support (BLS) level, and no hospital provided courses such as Advanced Cardiac Life Support (ACLS), Advanced Trauma Life Support (ATLS), or Paediatric Advanced Life Support (PALS) training.
172 8	Wesson (2015)	1. Training issues	 No formal or trauma-specific training, very few providers are trained in BLS or ACLS.
9		2. Resource issues	2. Lack of basic trauma equipment.
10		3. Geographic barriers	3. Distance to a facility
11 12		4. Pre-hospital issues	4. A publically available ambulance system did not exist, lack of community awareness of emergency phone number, lack of function of emergency phone number
13		5. Transportation issues	5. Lack of transport to the health care facility.
14 15		6. Staffing issues	It is not safe for the medical officers to report to the hospital at night
16		7. Financial issues	7. Inability to pay hospital fees and transport
17 18		8. Respondents' opinion on how to improve pre-hospital care	 Provide first aid and triage trauma training to community members and the police
19		9. Factors affecting the decision to seek care	9. Severity of the injury, traditional medicine and religion
73 20	WHO (2015)	1. Availability of potatble water	1. Globally: 62%, AFRO: 58%, AMRO: 70%, SEARO: 78%
21		2. Avavilability of sanitation	2. Globally: 81%, AFRO: 84%, AMRO: 57%
		3. Availability of hand hygiene (soap)	3. Globally: 65%, AFRO: 64%, AMRO: 65%
22 74 23	Zaidi (2013)	1. Median travel time to ER	1. From Hyderabad: (20 minutes), from Mansehra (120 minutes).
24 25		2. Odds ratio associated with patients likely to seek immediate health care at a non-medical facility or administer self- treatment compared to visiting a medical facility	2. Peshawar: 144.45 , Bahawalpur: 131.36, Abbottabad - 5.12, Hyderabad - 6.87
26 27 28	Zimmerman (2020)	Percent of patients who waited the following times to evaluated by a physician in the ED	Percent of patients who waited the following times to evaluated by a physician in the ED
28 29		1. 0.0 to 15.0 minutes	1. 69.2%
29 30		2. 15.1 to 30.0	2. 19.0%
30 31		3. more than 45.0 minutes	3. 7.8%
32		4. 30.1 to 45.0 minutes	4. 4.1%
33		5. Percent of patients who waited the 0.0 to 1.0	
34		hours to receive lab tests	5. 48.4%
35		6. Percent of severe GCS patients who	4
36		received lab tests within 1.0 hours of physician	6. 56.1%
37		evaluation	
38		7. Percent of mild GCS patients who received lab tests within 1.0 hours of physician evaluation	7. 52.0%
39 40 <u>41</u>		 Percent of moderate GCS patients who received lab tests within 1.0 hours of physician evaluation 	8. 53.0%
41 42			
42			
44			
			-

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	NA
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5-6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5-6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5-6, Supplement
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6-7
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	7-9
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	7-8
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	NA



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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	7-9
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	10
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	10-12
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	10-19
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	10-19
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	19-20
Limitations	20	Discuss the limitations of the scoping review process.	21-22
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	22-23
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	1

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where sources of evidence (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with information sources (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colguhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467-473. doi: 10.7326/M18-0850.

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Defining Measures of Emergency Care Access in Low- and Middle-Income Countries: A scoping review

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1 Title: Defining Measures of Emergency Care Access in Low- and Middle-I	ncome
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- 2 Countries: A scoping review
- 3 Short Title: Access measures of emergency care in LMICs
- 4 Authors
- 5 Sarah Hirner, MS (1)
- 6 Jyotshila Dhakal (2)
- 7 Morgan C Broccoli (3)
- 8 Madeline Ross (4)
- 9 Emilie Calvello Hynes (4)
- 10 Corey B Bills (4)*
- 11

1

- 12 1. University of Colorado, School of Medicine, Aurora CO
- 13 2. University of Colorado Denver, Denver CO
- 3. Brigham and Women's Hospital, Department of Emergency Medicine, Boston MA 14
 - re, De, 15 4. University of Colorado, School of Medicine, Department of Emergency Medicine, Aurora, CO 16

17

- 18 *Corresponding Author
- 19 Corey B Bills
- 20 (ORCID: 0000-0002-3456-6008)
- 21 University of Colorado
- 22 School of Medicine
- 23 Department of Emergency Medicine
- 24 Leprino Building, 12401 E 17th Ave, Aurora CO 80045
- 25 Email: Corey.bills@cuanschutz.edu
- 26 Phone: 9174148899

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2 3 4 5	32	Abstract
5 6 7	33	Background: Over 50% of annual deaths in low and middle-income countries
8 9 10	34	(LMICs) could be averted through access to high-quality emergency care.
11 12	35	Objectives: We performed a scoping review of the literature that described at least
13 14	36	one measure of emergency care access in LMICs in order to understand relevant
15 16	37	barriers to emergency care systems.
17 18		
19	38	Eligibility criteria: English language studies published between January 1, 1990,
20 21	39	and December 30, 2020, with one or more discrete measure(s) of access to
22 23	40	emergency health services in LMICs described.
24 25	41	Source of evidence: DubMed Embase, Web of Science, CINAHI, and the grav
26	41	Source of evidence: PubMed, Embase, Web of Science, CINAHL, and the gray
27 28	42	literature.
29 30	43	Charting methods: A structured data extraction tool was used to identify and
31 32 33 34 35	44	classify the number of 'unique' measures, and the number of times each unique
	45	measure was studied in the literature ('total' measures). Measures of access were
	46	categorized by access type, defined by Thomas and Penchansky, with further
36 37	47	categorization according to the 'Three Delay' model of seeking, reaching, and
38 39	48	receiving care, and the World Health Organization's Emergency Care Systems
40 41 42	49	Framework (ECSF).
43	50	Results: A total of 3103 articles were screened. 75 met full study inclusion. Articles
44 45	51	were uniformly descriptive (n=75, 100%). 137 discrete measures of access were
46 47	52	reported. Unique measures of accommodation (n=42, 30.7%) and availability (n=40,
48 49	53	29.2%) were most common. Measures of seeking, reaching, and receiving care were
50	54	22 (16.0%), 46 (33.6%), and 69 (50.4%), respectively. According to the ECSF
51 52	55	slightly more measures focused on prehospital care—inclusive of care at the scene
53 54	56	and through transport to a facility (n=76, 55.4%) as compared to facility-based care
55 56 57	57	(n=57, 41.6%).
58 59	58	Conclusions: Numerous measures of emergency care access are described in the
59 60	59	literature, but many measures are over addressed. Development of a core set of
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60 access measures with associated minimum standards are necessary to aid in 61 ensuring universal access to high-quality emergency care in all settings 62 **Strengths and Limitations** 63 64 We performed an extensive search in multiple databases and the gray literature of all emergency care access measures according to known best principles of 65 66 scoping reviews. 67 Categorization of measures was performed according to 3 separate frameworks of access and emergency care. 68 69 This study is limited to the available English-language literature. 70 Given limitations in the data, we cannot comment on the feasibility of 71 implementing the categorized access measures, provide consensus on which measures correspond to more likely improvements in patient outcomes, nor 72 provide minimum standards for measures. 73 74 Introduction 75 The past 20 years have been called a golden age of public health. (1) A dramatic 76 77 increase in global health funding has expanded health care resources in low- and 78 middle-income countries (LMICs). (2-4) As a result, significant reductions in 79 infectious disease-related, neonatal, and maternal mortality have been achieved in line with the United Nations Millennium Development Goals. (5) Further reductions in 80 global mortality attributable to non-communicable diseases and trauma has been far 81 82 less substantial. (6) While a shift from disease specific programs to health system 83 strengthening, equity, and social protection has been an important first step,

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progress on current Sustainable Development Goals remains lacking and has been
further hampered by existing health inequities made worse by the COVID-19
pandemic. (7)

Improvements in both prehospital and facility-based emergency care have the potential to impact many of the SDGs, lead to marked improvements in healthcare systems, and reduce deaths across multiple disease categories.(8) Estimates suggest that over 50% of annual deaths in LMICs could be averted by the implementation of quality emergency care systems. (9-12) The increasing mortality burden of non-communicable diseases, including injury and chronic conditions, coupled with the acute medical needs of emerging pandemics, such as SARS-CoV-2, requires the development of robust emergency care systems. (1, 13, 14)

In 2018, the World Health Assembly passed resolution 72.16. ensuring the role of emergency care in all health systems. (15) In order to provide further clarity to practitioners and policy makers on the role of emergency care, the WHO developed the Emergency Care System Framework (ECSF). The Framework defines a set of core essential functions of an emergency care system at the scene of illness, during transport, and within health facilities. (16) Unfortunately, many who live in resource-limited settings lack access to the human resources, equipment and information technologies needed for a capable high functioning emergency care system. (17)

Previous descriptions of known measures of emergency care quality (18, 19)
 and barriers to emergency care access (20, 21) have highlighted gaps in emergency
 care in LMICs, but no comprehensive review on measures of emergency care
 access in LMICs has been completed to date. The aim of this scoping review is to
 categorize all known measures of emergency care access in LMICs in order to help
 standardize and prioritize emergency care development.

1 2		
3 4	109	
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	110	Materials and Methods:
	111	Search Strategy
	112	A rigorous search strategy was employed with the goal of identifying all peer-
	113	reviewed studies that described measures of access to emergency care in LMICs.
	114	For this review we use the term measure to describe indicators, metrics, and other
	115	measurable components of access to emergency care. We performed a scoping
	116	review using the following databases: PubMed, Embase, Web of Science, and
	117	CINAHL. A subsequent gray literature search was conducted via both Google and
25 26	118	Google Scholar, with searches targeted toward organizations that work on global
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47	119	emergency care.
	120	The initial search strategy (Supplementary Material: Appendix 1) was
	121	developed within PubMed and adapted for the remaining databases. Search terms
	122	included various iterations of access, emergency care, and LMICs. Free text terms
	123	and standardized MeSH headings/subheadings were utilized to optimize sensitivity
	124	for relevant literature while minimizing excess search results. The reference lists of
	125	relevant primary studies and reviews likely to meet inclusion criteria were also
	126	reviewed manually to both verify search sensitivity and identify other potentially
	127	relevant studies that were not identified by the electronic search. The initial search
48 49 50	128	was performed in 2020, with a subsequent updated search in November 2022.
51 52 53 54 55	129	The gray literature search was completed via Google and Google Scholar. We
	130	performed targeted searches using similar terms relevant to access, including
56 57	131	affordability and barriers to care. The search was targeted toward government
58 59 60	132	ministries of health, professional organizations specific to emergency care, and

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3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 9 20 21 22 23 24 25 26 27 28 29 30 31 32 33 4 35 36 37 38 9 40 41 42 43 44 5 6	133	among well-established non-governmental organizations, including development
	134	agencies and those specific to healthcare policy. There was no initial regional or
	135	income level specifications given to this search.
	136	Studies published between January 1, 1990, and December 30, 2020,
	137	English-language, and describing at least one discrete measure of access to
	138	emergency care services in at least one LMIC were included. LMICs were defined by
	139	World Bank economic definitions as the Gross National Income (GNI) per capita of
	140	the year the research was performed. Articles were excluded that were clearly
	141	irrelevant to the topic, did not involve emergency care, did not describe a measure of
	142	access or measurable barrier to emergency care, or did not include data from at
	143	least one LMIC. For the purposes of this review, we excluded data specific to
	144	emergency obstetric and newborn care seeking (EmONC; we anticipate a separate
	145	forthcoming review on the subject). As a scoping review, this manuscript does not
	146	involve human subjects and is exempt from ethics review based on the
	147	corresponding author's IRB.
	148	Patient and Public Involvement
	149	Given the nature of this study it was not possible to involve patients or the public in
	150	the design, or conduct, or reporting, or dissemination plans of our research.
	151	Data Processing
47 48		
49 50 51 52 53 54 55 56 57	152	Manuscripts meeting initial broad search criteria were imported into Covidence
	153	(Covidence systematic review software, Veritas Health Innovation, Melbourne,
	154	Australia) and duplicates removed. Initial title and abstract review were performed by
	155	two independent authors (SH, JD). Disagreements were resolved by a third reviewer
58 59	156	(CB). The same procedure was followed for full text review.
60		

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Data from included manuscripts were extracted and included the following:
author(s) and full citation, publication date and study timeframe, location, study type,
setting, methodology, access measure(s) reported, and the primary outcome(s).
Countries under study were categorized by income level, WHO region, whether the
study was local, regional, national or multinational in scale, and whether the
populations under study were rural or urban.

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163 Data Analysis

A structured data extraction tool was used to identify and classify both the number of 'unique' measures, and the number of times a unique measure was studied in the literature. In this manuscript the summation of all of the times each unique measure was studied is referred to as 'total' measures. Unique access measures were aggregated and categorized by access type.

The term "access" is often used as shorthand for distance, leading to a focus on individual patient proximity, either spatial or temporal, to a given health service. (22) While vital, proximity is but one component of accessibility and may not correlate with the true ability to receive quality emergency care. (23) For this scoping review we revert back to a more expansive definition of access, one rooted in a rights-based approach to emergency care and reflecting the spectrum of fit between user and service and inclusive of five dimensions of access—availability, accessibility, accommodation, affordability, and acceptability-as described by Penchansky and Thomas. (Table 1; 24-25) We also reference a modified version of this framework which includes awareness. (26) In Penchansky and Thomas' framework, access is examined through the "fit" of the patient with the health care system. For example, a health care facility may be available (that is, it exists), but not accessible because of transportation barriers. In addition, the health care facility may

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1 2									
3 4	182 not have necessary measures to accommodate a patient (such as 24-hour-access or								
5 6	183	chil	hildcare), may be unaffordable, or may be unacceptable (i.e., due to poor quality or						
7 8	184	cor	ruption). While dated, and origina	ally validated in the cons	sumer patient satisfaction				
9 10 11	185	wor	ld, multiple recent studies on he	althcare access in low-	and middle-income				
12 13	186	stu	dies have shown utility and validi	ity for this framework, in	cluding among geriatric				
14 15	187	healthcare in Southeast Asia, on HIV treatment access during Covid in Ghana, and							
16 17	188	am	ong displaced in the Lake Chad	region of Cameroon, Ch	ad, Niger and Nigeria.				
18 19 20	189	(27	-29)						
20 21 22 23 24 25 26 27 28	190 191 192 193 194	 Table 1. Proposed Emergency Care Access Measures for Monitoring, Evaluation and Comparative Analysis by Access Type 3 							
29 30	Access T	уре	Definition from Penchansky and Thomas	Adapted definition for emergency care	Proposed sample emergency care access measures				
31 32 33 34	Availability		The relationship of the volume and type of existing services to the clients' volume and types of needs	The relationship between EU services and those seeking EC.	Number of EC beds per catchment area Presence of drug, technology, or interventions specific to EC Presence of EC clinicians 24 hours a day Percent of clinicians with EC training				
35 36 37 38 39	Accessibility		The relationship between the location of supply and the location of clients, taking account of client transportation resources and travel time, distance and cost	The proximity (in time and space) of a patient to EU care.	Distance to closest emergency care facility Time to closest emergency care facility Available transport Time associated with transport Cost of transport to emergency care				
40 41 42 43 44	Affordability	у	The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance.	The cost of EU services and care, relative to patient's household income and ability to pay.	Cost to access initial EC service Cost of individual services specific to EC (specific to individual care type) Overall EC cost per visit				
45 46 47 48 49 50	Accommodation		The relationship between the manner in which the supply resources are organized to accept clients (including appointment systems, hours of operation, walk-in facilities, telephone services) and the clients' ability to accommodate to these factors and the clients' perception of their appropriateness	The manner in which EU services are organized (time of operation, level of training and services able to be rendered) relative to a patient's need.	Hours of operation of EU Number of transfers per patient Average EU time to provider Training provided per specific EU interventions				
51 52 53 54	Acceptability		The relationship of clients' attitudes about personal and practice characteristics of existing providers, as well as to provider attitudes about acceptable personal characteristics of clients	The relationship between a patient's individual belief system and larger socio-cultural attributes and their willingness to seek EC.	Understanding of how to navigate EC system Acceptability of EU care Acceptability of EU conduct or attitudes Acceptability of ambulance use				
55 56	195								
57 58	196		More recently other models h	nave emerged that may	provide greater				
59 60	107 applicability to amorgonov care. With this in mind we provide applyces and								

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198 categorize access measures via two additional frameworks. The 'Three Delay' 199 model, was originally conceptualized to understand delays in care leading to 200 increased maternal mortality but has been more recently applied to emergency care. 201 (30, 31) The Three Delay model defines three critical phases of timely care: seeking, 202 reaching, and receiving care. The World Health Organization's ECSF provides 203 another method of understanding emergency care access. The ECSF defines the 204 human resources, equipment, and functions necessary for a fully functioning 205 emergency care system at the scene of illness, during transport to a health facility 206 (prehospital), and within healthcare facilities. (9, 16) 207 All extracted access measures were collected, with similar measures 208 collapsed into singular unique measures. We report the number of unique measures 209 and the total number of times a measure is reported as a number and percent. Each 210 measure was then categorized according to the three frameworks listed above. Given the heterogeneity of study methods and types, a qualitative analysis and 211 212 narrative synthesis was undertaken. Thematic analyses focused on the number and 213 general quality of the measures used. Trends and ranges among studies with 214 comparable numeric measures are reported where appropriate. We did not perform a grading of the literature given the overall observational nature of most studies. 215 216 Criteria proposed by the Preferred Reporting Items for Systematic Reviews and 217 Meta-analyses Extension for Scoping Reviews statement were adhered to in 218 reporting.(32) 219 Results 220 A total of 3103 articles were identified for screening via database searches, and 30 221 were included from the gray literature and hand searches of relevant literature

60 222 (**Figure 1**). After removal of 993 duplicates, 2140 articles were screened by title and

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3 4	223	abstract, 203 articles met criteria for full text screening, after which 128 articles were
5 6	224	excluded. In sum, 75 articles met full criteria for inclusion. (Supplementary Material,
7 8	225	eTable 1)
9 10		
10 11 12	226	[Insert] Figure 1. Prisma Flow Diagram for review of literature on access to
13 14	227	emergency care measures in LMICs.
15		
16 17	228	All but one of the 75 studies were published in peer-reviewed journals. The
18 19	229	majority (n=44, 58.7%) of studies examined access related to general emergency
20 21	230	care; 22 (29.3%) were relevant to prehospital care, 10 (13.3%) were specific to
22 23 24	231	trauma care, and one (1.3%) article focused on pediatric patients. (Table 2)
24 25 26	232	Geographically, publications included data from all six WHO regions, with the
27 28	233	majority from the African Region (n=35, 46.7%). The majority of included studies
29 30	234	originated from lower-middle income countries (n=37, 49.30%), with additional
31 32 33	235	studies from upper-middle income countries (n=15, 20.0%) and low-income countries
33 34 35	236	(n=11, 14.7%). Twelve articles (16.0%) included data from multiple income groups.
36 37	237	Table 2. Characteristics of manuscripts for study inclusion
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39		

Characteristic	N (%)
	N=75
Country	
Multinational	12 (16.0)
Ghana	7 (9.3)
Pakistan	6 (8.0)
Kenya	5 (6.7)
India	5 (6.7)
South Africa	4 (5.3)
Brazil	3 (4.0)
Other*	32 (42.7)
WHO Region	
Africa	35 (46.7)
Americas	7 (9.3)
Eastern Mediterranean	5 (6.7)
European	1 (1.3)
South-East Asia	15 (20.0)
Western Pacific	7 (9.3)

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Multiple WHO Regions	5 (6.7)	
ncome level		
Low	11 (14.7)	
Lower-middle	37 (49.3)	
Upper-middle	15 (20.0)	
Multiple	12 (16.0)	
Settings	, ,	
Local	9 (12.0)	
Regional	34 (45.3)	
National	20 (26.7)	
Multinational	12 (16.0)	
Setting if Local or Regional**		
Urban	8 (18.6)	
Rural	32 (74.4)	
Both	3 (2.3)	
Article Type	· ·	
Quantitative	24 (32.0)	
Qualitative	47 (62.7)	
Mixed	4 (5.3)	
Vethodology		
Descriptive (Interview)	14 (18.7)	
Descriptive (Survey)	13 (17.3)	
Cross sectional	43 (57.3)	
Mixed methods	5 (6.7)	
Observational pre/post (Cohort, RCT)	0 (0.0)	
Population focus	<i>L</i> .	
General EM care	44 (58.7)	
Prehospital care	22 (29.3)	
Trauma care	10 (13.3)	
Pediatrics	1 (1.3)	
Number of study participants		
0-50	7 (9.3)	
51-100	3 (4.0)	
101-500	9 (12.0)	
501-2000	1 (1.3)	
>2000	7 (9.3)	
	48 (64.0)	

**N= 43

 243 Methodologically, all studies were descriptive and relied on key informant 244 interviews (n=14, 18.7%), surveys (n=13, 17.3%), or cross-sectional data (n=43,

Thailand, Vietnam, Yugoslavia, Zambia, Zimbabwe

57 57 58

Nigeria, Philippines, Rwanda, Samoa, Solomon Islands, Sierra Leone, Sudan, Tanzania,

⁵⁸₅₉ 245 **57.3%**). No manuscript reported a comparator group, and the majority of studies

were qualitative in nature (n=47, 62.7%). Studies varied in the number and type

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(patients, clinical providers, administrators) of participants. The majority of studies

participants. Participant enrollment ranged from 11 to 32,774 individuals. The types

(n=48, 64.0%) used cross-sectional data and did not specify the number of

8 9	247	participants. Farticipant enrollment ranged nom 11 to 52,774 individuals. The types						
) 10 11	250	of health facilities under study also varied, and included emergency care as						
12 13	251	accessed at clinics, district hospitals, referral hospitals (with access to intensive						
14 15	252	care), and more formal emergency units or departments.						
16 17	253	Measures by access type						
18	200							
19 20	254	In sum, 137 unique measures of access were described in the 68 studies (Table 3).						
21 22 22	255	Of the 75 total studies, most (n=49, 72.1%) reported more than one unique measure.						
23 24 25	256	Based on Penchan	sky and Thomas' cat	egories, the highe	est number of discrete			
25 26 27	257	measures of acces	s described accomm	odation (n=42, 30	.7%), followed by			
28 29	258	availability (n=40, 2	9.2%). In many insta	nces, a single me	easure was studied			
30 31	259	reported more than	once leading to a to	tal of 306 total me	asurements. Among total			
32 33	260	measures, measure	es of availability (n=1	20, 35.7%) were o	disproportionality over			
34 35 36	261	represented while r	neasures of affordab	ility were underre	presented (n=34, 10.1%).			
37 38 39 40	262	Table 3. Unique and total number of access measure categorized by access						
41 42	263	type						
43 44		Access category	Unique measures	Total measures				
44 45		/ lococo calegory	N=137 (%)	N=336 (%)				
46		Availability	40 (29.2)	120 (35.7)	-			
47		Accessibility	19 (13.9)	66 (19.6)				
48 49		Accommodation	42 (30.7)	62 (18.5)				
49 50		Affordability	17 (12.4)	34 (10.1)				
51		Acceptability*	19 (13.9)	54 (16.1)				
52 53	264		nted for 4 of the uniqu	ue measures	_			
 54 55 265 Availability 56 								
57 58 59	266	Unique measures of	of availability, defined	as the relationshi	ip of the volume and type of			
60	267	existing services to	the clients' volume a	and types of needs	s, totaled 40 (29.2%; Table			
					1			
		For pee	review only - http://bmjor	pen.bmj.com/site/abou	ut/guidelines.xhtml			
				-	5			

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3 4	268	1). Total measures of affordability were studied most often (n=120, 35.7%, Table 4).
5 6	269	Of the unique measures, most (n=29, 72.5%) focused on receiving care.
7 8	270	Measurements on receiving care often measured the presence or lack of basic
9 10 11	271	emergency health facilities and resources relevant to emergency care. There was
12 13	272	heterogeneity when describing resource service availability, such as the availability
14 15	273	of emergency radiologic services (e.g., CT and MRI) and emergency laboratory
16 17 18	274	service (e.g., blood smears for malaria). Measures owing to the presence or absence
19 20	275	of clinical providers with qualifications relevant to emergency care were described in
21 22	276	9 of the 75 studies (12.0%).
23 24 25	277	Table 4. Unique access measures categorized by type and delays in care
26 27 28	278	
29 30 31	279	Table 4. Unique access measures categorized by type and delays in care
32 33 34	280	
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1				/ri -2	
2	Availability N=40	Accessibility N=19	Accommodation N=42	Affedabili N=17	Acceptability N=19
Seeking N=22	N=2	N=3	N=5	N=1 , P	N=11
4 5 6 7	Presence of community (lay) responders (62)	Patient access to a telephone (6, 11, 63)	Ability to get through on phone lines on first attempt (6)	Inability miss work/seendar to cost (10)	Acceptability of EU care: by sex (21); by education level (23); age (23, 47); economic/financial status (53); social status (13); insurance (13); appearance (13); ethnicity (60); religion (60, 72), proximity to health facility (53)
8	Presence of dispatchers (68)	Presence of a national universal toll-free emergency number (6, 9, 10, 13, 14, 28, 43, 62, 71)	Concerns over personal safety in seeking care (25)	17 <i>J</i> for u	Awareness of emergency care systems and services (5, 11, 52, 61)
9 10		Median time from onset of patient symptoms to contact with provider (13, 57)	Patients and families responsible for arranging their transportation to the higher-level facility (14)	April Ense	Community accepts and utilizes EMS care (62)
10			Presence of adequate child care (10)	re re	Fear of emergency dental treatment (47)
			Required paperwork filled out before emergency	2023. relate	Knowledge of emergency number (22, 27, 52, 57,
12			care (13)	ed to t	72) Knowledge of where the closest EU facility is located (52)
14					Personally knew a healthcare provider (13, 60)
				tex:	Preference of traditional methods of care (e.g.,
15				Superieu and	bonesetters) over EU care (5, 8)
16					Social and family disapproval (53) Understanding of how to navigate emergency care
17				요들국	systems: general (6, 14, 23, 59)
18				ta r	Understanding of what qualifies as an emergency condition/perception that condition is severe enough to seek care (8, 17, 23, 52, 53, 72)
19 Reaching N=46	N=9	N=13	N=12		N=4
20	Basic building (i.e., structural) resources specific and purpose built to emergency care (26)	Dispatcher training provided (6)	EMS delays: general (25); due to referrals (59)	Ambulare fee	Ambulances acceptable based on: language (63), if police involved/transport (63), slow response time (52)
22 23	EU radio/communication devices available for EMS handoff (30)	Geography limits access: rural locations (1); mountainous terrain (10)	Existence of a coordinated emergency response system (9, 28, 43, 71, 72)	Ambular teceby ambular ambular	Patient preference of ambulance care over other forms of transport (52)
24 25	Fuel available for ambulances (14)	Calculated accessibility by 2SFCA method (24)	Equitable (plan for) distribution of ambulance stations (63)	Ambular ereferral fee (27)	Prehospital care acceptable to: those taking government ambulance (56), those taking taxis (56), road traffic accident victims (56), those being transferred for medico-legal reasons (56)
26	Fuel for general (non-ambulance) transport (14)	Percent of patients who sought care or made it to a facility	Facilities are notified in advance of patients	Cost of tensport (11, 14,	Previous ambulance use and willingness to use
27	Presence of any healthcare facility (14)	within 60 minutes of onset of symptoms (59) Response time from initial call to scene (3, 7, 14, 22, 35, 63,	arriving (15) General maintenance issues with vehicles (11)	17, 19, 22, 47, 2) Paymen (required before	ambulances in the future (63)
-28	Presence and number of ambulances for interfacility transport	70) Roadways limits access: traffic (1); poor or narrow roads (11,	Number of separate modes of transportation	treatmert (34) O	
29	(20)	14, 20, 52)	(per patient) to reach care at facility (20)	Preautherization fee (64)	
30	Presence and number of ambulances with basic life support capabilities (46)	System to access EC from trained first responders and the scene and urgent transport to a health facility (49)	Patients taken to the police station before taking them to the hospital (13, 14)	Fees are equitable (64)	
31 32	Presence and number of ambulances without medical capabilities/transport only (52)	Transport time from a location to a facility with specific EU capabilities (i.e., PCI-capable hospital, trauma center, obstetric emergencies, tertiary hospital; 36, 45, 48, 55)	Percent of missed or prolonged pick-ups due to prehospital provider misunderstanding of location (6)	Private Vehicle transport fees (27	
33	Presence and number of helicopters for transport (68)	Transport time from home to hospital (2, 36, 46, 48, 51, 54)	Presence of drivers willing to respond to patient request (11)	2025 logi	
34		Transport time from scene to hospital (13, 29, 33, 35, 74)	Private ambulance services control rooms linked to cellular networks (68)	es.	
35		Travel distance (5, 13, 14, 21, 20, 22, 27, 32, 51, 57, 59, 66, 71, 72)	Regulations governing EMS (43)	Ag	
36 37		Travel time from home to national ambulance service station (67)	System for care during transfer to a facility or between facilities that has the capability to	yence	
38		Weather/Climate limits access: rainy season (11)	handle the case (20, 49)		
30 Ceiving N=69	N=29	N=3	N=24	N=8 III	N=4
40					
41	Absolute number of EU providers (stratified by type: physicians, nurses, and EMS providers; 6, 10, 13, 14, 17, 18, 30)	Number of (trauma) fatalities within and outside the first hour (70)	Presence of disaster plan including, additional staffing for disasters (49, 68)	Absolute cost E EC treatment (5, 1 2 17, 21, 23, 34, 47, 53, 71, 2)	Acceptable providers conduct and attitudes towards patients (13, 14, 57)
42 43				nique	1.
44 45		For peer review only - http://bmjopen.bn	nj.com/site/about/guidelines.xhtm	nl de	

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1				open-2 copyri	
3	Advanced cardiac life support or resuscitation equipment available in ambulances or number of ACLS ambulances (28, 30, 46, 56)	Fatality rate per patient kilometer from facility (70)	Availability of 24-hour ambulance care (no night hours, 52)	Copayring t for Gre (65)	EC in line with patient's human rights (58)
4	Availability of basic EU medications available (13, 15, 47, 50)	Able to access and receive care in last 12 months (61)	Availability of 24-hour emergency care (13, 26, 57)	Cost of facility reatment (19)	Providers/percent of providers deemed corrupt (13)
5 6	Availability of basic EU resources/equipment (9, 13, 14, 18, 20, 26, 30, 50, 71, 72)		Availability of 24-hour staff availability (20)	Cost of Bedica investigations and radiography (192	Sought care for wounds/trauma (5)
7	Availability of EU infection control materials including soap (26, 77)		Care provided during transport (14)	Cost of medicines (17, 23)	
8 9 10	Availability of EU procedures: Needle thoracostomy (15); chest tube (15); pelvic binding (15), defibrillation (15), cardioversion (15), pericardiocentesis (15); external cardiac pacing (15); Blood transfusions (15, 32)		Care provided at lower-level facility before transfer (14)	Cost of treatment by a boneset for for the Cost of treatment by a	
10 11 12	Availability of EU specific supplies and equipment: 49, Suture and wound care supplies (15); Gloves (15); Oxygen (15, 45); Stethoscopes (20); Glucometer (15); Pulse oximetry; ECG machine (15); Resuscitation equipment (8)	\sim	Legal protections for ambulance providers distributing and providing care (28)	Hospital or seven the sevent the seven the seven the seven the seven the seven the sev	
13	Availability of imaging (General: 17, Xray: 15, CT: 30, 68, ultrasound or MRI: 30)	0.	Miscommunication or mis-triage of patient acuity (6)	individuating nees) (34) Payment required in cash for imaging 245	
14	Availability of laboratory/diagnostic testing material (general blood/urine tests: 17, 30, 32, 57; malaria smears: 32)		Number of transfers per patient (6)	Superieu Text and	
- 15 -16	Availability of potable (sterile) water (20, 73)		Number and Percent mis-triage (6)	ade peri	
17	Availability of pre-hospital providers with standardized training (9, 22, 28, 52, 56)		Percent of hospitals with out-of-hours clinician coverage (18)	으들 술	
18	Availability of sanitation (toilet, 73)	Co	Physician comfort in adequately performing EU- specific procedures (30, 50)	a fa An	
19 20	Availability of specified care: trauma care (4); orthopedic (fracture) care (8, 15, 15); obstetrical emergencies (20); HIV care (20); cholera (20); tuberculosis care (20); general surgical services (20); dental care (20); critical care (20);		Presence of overcrowding (49)	n http://b BES) . mining,	
21 22	ophthalmological care (20) Electricity available (20, 26, 45)	· · · · · · · · · · · · · · · · · · ·	Presence of a standardized EMR (13)	bmjop , Al tra	
-23	Emergency equipment list available (20)		Protocols for patient transfers (20)	tra <mark>p</mark>	
24	First aid received on scene by lay providers (i.e., members of the public, other motorists, or the less injured casualties; 34, 49)		Protocols specific to trauma care (15)	aining, and	
-25 -26	First aid received on scene by trained providers (34)		Safe passage for health providers to the hospital at night (72)	<u>କୁ</u> ଥୁ	
20	Number of doctors staffing EU (appropriate for size; 68)		Staff comfort in treating EU conditions (32, 34)		
27	Number of EU-specific area beds (20)		Training for community members and police: First aid and triage (72)	simi on	
29	Number of hospital-facility (non-EU specific) rooms or beds (10, 19, 57)		Training for providers: adult triage (18)		
30	Presence of EU with resuscitation bed/zone (49, 50)		Training for providers: EU-specific (13, 14, 27, 46, 71)	June ar tec	
31	Presence of EU (within facility; 2, 68)		Training for providers: pediatric triage-specific (18)	e 11 schr	
32	Presence of EU dedicated nursing personnel (18) Presence of facility burn unit (2)		Time to lab tests (75); by patient GCS (75) Time to provider (e.g., wait time; 25, 75)	, 20	
33 34	Presence of triage (13, 14, 49, 50)		Utilization and access to standardized clinical care guidelines: general approach (15, 49);	gie 25	
35	Staff qualified to utilize EU equipment (26)		condition specific (sepsis, DKA, anemia, 15)	is. at A	
36	Staff gualified to treat EU conditions (27)			igen	
37	Staff with EC training: ACLS or BLS training (30, 71, 72);		1	nce	
38	ATLS, PALS (30, 72) Staff with specialized training relevant to EC: 49, adult critical				
39	care (18); continuing education (18); EU equipment use (20); neonatal care (50)			iblio	
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Unique measures of accessibility—the location of supply and the location of clients totaled 19 (13.9%), with a disproportionate number of measures studied more than once, leading to 66 total measurements (19.6%). The majority of the unique measures of accessibility corresponded to the process of reaching care (n=13, 68.4%) with most measures on the distance or time to a health service (n=11, 64.7%). Among the 13 studies reporting time, travel times to emergency care ranged from 5 minutes to 2 hours. The range of distances to health facilities demonstrated similar variability, though most (n=13) measurements were in kilometers. An additional study (n=1) reported on the percentage of the population living within a given distance or time, while other studies (n=4) reported on a range of distances or times to specific EU care (e.g., trauma, referral, cardiac). Other qualitative barriers to accessibility were also provided, including the effects of terrain, weather, and road quality.

Accommodation

Accommodation measures are those that assess the manner in which emergency care resources are organized to accept patients. Measures of accommodation made up the greatest number of unique measures (n=42, 30.7%), but they were rarely studied more than once (total n=62, 19.6%). Adequacy of child care, concerns over personal safety, and difficulties in getting through to prehospital providers were described as significant barriers in the process of seeking emergency care. The majority of unique measures on accommodation dealt with the process of receiving care (n=25, 59.5%). Among measures categorized as receiving care, facility-based measures (n=11, 44.0%) included measures of provider timeliness and availability, provider training.

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overcrowding, and protocols for care. Among the unique measures of accommodation, four (8.9%) described the use of standardized protocols (three related to prehospital care and one on facility-based care).

Affordability

Measures of affordability or assessing the cost of services relative to a patient or caregivers finances, were the least studied. While the 17 (12.4%) unique measures were similar to the numbers for accessibility and acceptance, measures were rarely studied more than once (n=34, 10.1%). Of the unique metrics reported, most reported on different aspects of the cost of transportation in reaching care (n=8, 47.1%) and the cost of receiving treatment (n=5, 29.4%). Types of costs varied, including cost of an ambulance ride, cost of deposit before treatment, and total hospital bills. A single study described the lack of emergency care affordability based on lost wages from missing work.

Acceptability

Acceptability measures uncovered how well patient's attitudes around emergency care matched those of providers or systems. Seventeen (12.4%) unique measures of acceptability were described in the literature. The majority were related to the process of care seeking (n=11, 64.7%). Measures largely described patient's understanding, acceptability, willingness, and fears in activating and navigating emergency care systems.

Awareness

Lastly, some have argued for inclusion of awareness as a 6th category of access. There were 5 unique measures of awareness, which largely overlapped with the previous 5 other categories, most specifically acceptability. These five measures were reported a total of 18 times.

Access measures by frameworks of emergency care

Individual metrics were also mapped to the Three Delay model, and categorized as either, seeking, reaching, or receiving care (Table 4). Unique measures of seeking care (N=22, 16.1%) largely dealt with pre-facility care and included individual thought processes, the socio-cultural forces underlying care seeking behavior, or systematic structural barriers to seeking care. Measures of reaching emergency care (N=46, 33.6%) largely measured the adequacy of out of hospital care, including the presence, number and proportion of ambulances to population, the time from community to care, the cost of ambulance services, and distribution and systems of ambulance-based care. The majority of unique access measures described the processes of receiving care (n=69, 50.4%). Most measures dealt with the availability of facility-based care services.

Measures were also mapped to the WHO emergency care systems framework (**Table 5**). The WHO Framework 'captures essential emergency care functions at the scene of injury or illness, during transport, and through to emergency unit and early inpatient care'. (16) Roughly equal proportions of measures were focused on prehospital care—inclusive of care at the scene and during transport to a facility (n=76, 55.4%) and facility-based emergency care (n=57, 41.6%). However, given the largely linear nature of the framework, a total of 4 (2.9%) unique measures could not be defined by this framework and were neither specific to prehospital nor facility-based care. The

majority of out of hospital care measures focused on the transfer process (n=45 of 76,							
59.2%), while most facility-based measures dealt with EU-based care (n=51 of 57,							
majority of out of hospital care measures focused on the transfer process (n=45 of 76, 59.2%), while most facility-based measures dealt with EU-based care (n=51 of 57, 89.5%). None of the included manuscripts measured EU disposition or elements of early inpatient care. Table 5. Unique number of access measures as defined by the WHO Emergency Care Systems Framework. by access type. WHO ECSF Total* Site Primary Function N=133 (%) Availability N=18 (%) N=42 (%) N=17 (%) N=19 (%) Out of hospital care 76 (57.1) 11 (28.2) 17 (94.4) 25 (59.5) 9 (52.9) N=14 (73.7) 10 (5.9) 9 (47.4) 10 (5.9) EMS Dispatch 3 (2.3) 1 (2.6) 1 (5.6) 1 (2.4)							
early inpatient care.							
							Care Acceptability N=19 (%) 14 (73.7) 9 (47.4)
	Table 5. Unique n	umber of ac	cess meas	ures as defir	ed by the WHO	Emergency	Care
	Systems Framew				,	- 3 7	
VHO	ECSF	Total*			Access Type		
			Availability	Accessibility	Accommodation	Affordability	Acceptability
Site	Primary Function	N=133 (%)	N=39 (%)	N=18 (%)	N=42 (%)	N=17 (%)	N=19 (%)
Out of	f hospital care	76 (57.1)	11 (28.2)	17 (94.4)	25 (59.5)	9 (52.9)	14 (73.7)
	Bystander Response	17 (12.8)	1 (2.6)	3 (16.7)	3 (7.1)	1 (5.9)	9 (47.4)
	EMS Dispatch	3 (2.3)	1 (2.6)	1 (5.6)	1 (2.4)		
	Provider Response	11 (8.2)	2 (5.1)	2 (11.1)	6 (14.3)		1 (5.3)
	Transfer	45 (33.8)	7 (17.9)	11 (61.1)	15 (35.7)	8 (47.1)	1 (5.3) 4 (21.1)
acilit	y-based care	57 (42.9)	28 (71.8)	1 (5.6)	17 (40.5)	8 (47.1)	3 (15.8)
	Reception and Triage	6 (4.5)	2 (5.1)	6	4 (9.5)		
	EU Care	51 (38.3)	26 (66.7)	1 (5.6)	13 (31.0)	8 (47.1)	3 (15.8)
	Disposition					, <i>,</i> , ,	
	Inpatient Care						
Total	is out of 133, as 4 measu	ures could not	be defined by	ECSF			
	Diagonation						
	Discussion						
	Increased g	global acces	ss to quality	emergency	care has the pot	ential to redu	ice
	Discussion Increased global access to quality emergency care has the potential to reduce mortality associated with non-communicable illness and trauma as well as infectious disease and pregnancy related complications.(9-12) Analyzing emergency care access measures in detail has the potential to elucidate gaps in health systems—made worse by the Covid-19 pandemic—that can guide strategies to address existing inequities in care. To date, this is the first review of access measures specific to emergency care in LMICs.						
			:			II as infection	
	mortality associate	ed with non-	-communica	able illness a	nd trauma as we	ell as infectio	us
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Discussion

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This review revealed several common themes. The majority of unique emergency care access measures focus on availability and accommodation, but total measures of accessibility appear to be more frequently described in the literature. This has led to the disproportionate emphasis on distance and time to a health facility as demonstrative of emergency care access. In reality, upon arrival to a health facility with an emergency condition, most patients are met with limited, ineffective, or non-existent emergency care provision.

Relative to other categories of access reviewed, measures of affordability were the least studied in the literature. These measures often lacked information to contextualize data relative to the gross domestic product of the study population's cost of living. Cost is known to play a significant role in patient's overall healthcare access in all health systems, not just LMICs. (33) Costs associated with emergency health services are known to vary widely across health systems regardless of a country's GDP.(34, 35) Moreover, cost-effectiveness is a widely used method to inform resource allocation, yet evidence to better understand health inequity in all its forms, should include additional efforts to study the cost-effectiveness of emergency care interventions and emergency care systems in LMICs. Measures of access included in this study included both direct (user fees, medication costs, laboratory and imaging tests) and indirect (lost wages, travel costs). Further consensus led efforts to determine measures most important for system comparison are necessary.

In 2018 the World Health Assembly passed resolution 72.16. ensuring the role of emergency care in all health systems. (16) The WHO Emergency Care System Framework sought to provide further context to health policy makers on the role of

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> emergency care systems in ensuring universal health coverage. (16) While prehospital and facility-based measures of access were equally represented on the literature, though significant gaps remained in both domains. Among prehospital care, most measures focused on the transfer process, with less focus on dispatch and provider response. Several areas of this framework had no associated measures described in the literature.

According to the ECSF considerably few studies described measures related to the EU reception process (e.g., registration, screening, and triage) or the transfer of care between prehospital and facility-based providers. Additionally, no measures described the process of EU disposition or transfer of care to the inpatient ward. Though disposition, transfer, referrals, and transition of care from one provider to another are often cited as times of higher risk to patients, measures of this risk were not adequately described in this study.(36) Several WHO initiatives have sought to strengthen EU quality globally. Future efforts should seek to define and refine a core set of measures specific to emergency care access to aid in the monitoring and evaluation of those efforts. The further validation of a core set of measures with minimum standards across low, middle, and high-income contexts can help to further increase access to high quality emergency care and the expansion of universal health coverage.

Limitations

This study makes an initial attempt to describe measures of access to emergency care, but it is restricted in scope and possesses several limitations. First, this study is limited to English language articles only and does not include articles in other languages widely spoken in many LMICs, including French, Portuguese and Page 23 of 68

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Arabic. Second, while a gray literature review was conducted, we are likely missing measures in use by health facilities, global health organizations, and health ministries. Further attempts at key informant interviews or focus groups with those in LMICs. undoubtably would uncover other measures, but was beyond the scope of this review. Third, given the limitations in study data there was no attempt made to rank-order measures based on feasibility, nor the degree to which they correspond to specific patient outcomes. We recognize that not all measures have equal utility, with some better reflecting access to care issues and serving as more significant correlates of patient outcome. Fourth, though the actual corresponding outcome measures were collected (and described in Supplementary Material, eTable 2), given the heterogeneity of measures and limitations of the search strategy we were unable to provide reference (or minimum) standards for the access measures described. Future efforts hope to describe further the actual measurements. Other fields have attempted, at times with similar difficulty, to establish reference standards (e.g., the Lancet Commission on Global Surgery has recommended a maximum two-hour travel time to surgical services, while similar measures of time to surgery remain controversial (37, 38). However, very few consensus derived standards exist for measuring access to emergency care. (39) This lack of consensus makes further facility, regional, and national comparisons difficult and limits effective understanding of care. Similar to previous consensus work on measures of emergency care quality in LMICs, future efforts should aim to define a core list of indicators of access to emergency care. (19) Lastly, risk of bias assessment was not performed given the descriptive nature of most studies. Other methodologic and search strategy sought to limit bias in the initial selection of articles.

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Conclusions

Increasing access to quality emergency care is a key step in strengthening heath systems in LMICs. This scoping review demonstrates that while existing literature examines a wide breadth of access metrics, many gaps remain in our understanding of emergency care access in LMICs. As researchers continue to examine access and barriers to emergency care, special attention should be paid to those dimensions of access less commonly examined, such as affordability. Standardized, consensus-based measures of emergency care access in line with the ECSF should be developed to allow for more universal comparisons of healthcare functions.

Author Contributions

CB, ECH, and SH contributed to the conception and design of the work. SH and JD contributed to data collection and review. SH and CB contributed to data analysis and interpretation and drafting of the article. MB, MR, and ECH contributed to critical revisions of the article. All named authors have approved of the version to be published and agreed to be accountable for all aspects of the work.

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Ethics: As a scoping review, this manuscript does not involve human subjects and is exempt from ethics review based on the corresponding author's IRB.

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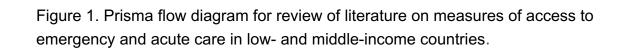
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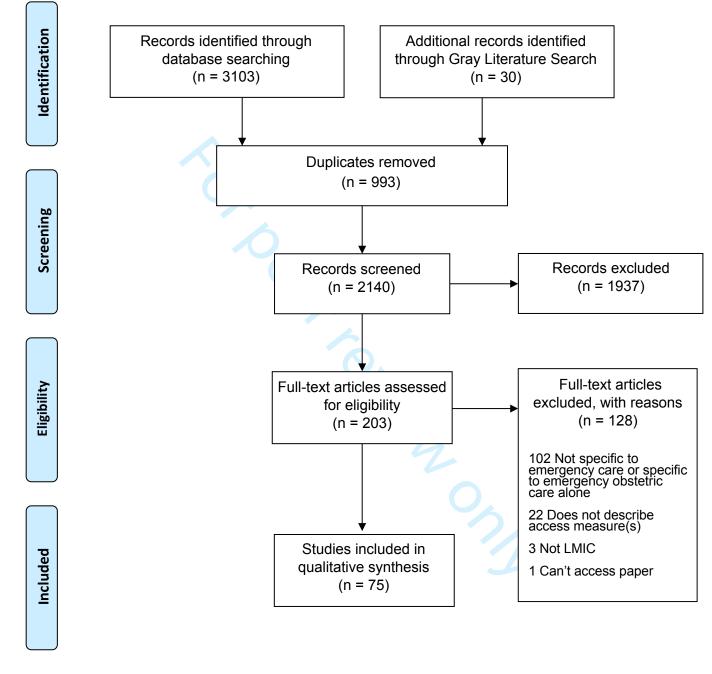
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Appendix 1

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56 57 Search Strategy: PUBMED

Initial Search: Feb 4 2020; Follow up search date: 11/22/2020; Second Follow up search date: 11/30/2020, revised for CINAHL performed on 11/20/2022

Emergency med terms

"emergency responder"[tw] OR "emergency responders"[tw] OR "emergency doctor"[tw] OR "emergency doctors"[tw] OR "emergency clinician"[tw] OR "emergency clinicians"[tw] OR "emergency physician"[tw] OR "emergency physicians"[tw] OR "emergency personnel"[tw] OR "emergency medical personnel" [tw] OR "emergency service" [tw] OR "emergency services"[tw] OR "emergency medical service"[tw] OR "emergency medical services"[tw] OR "emergency medicine"[tw] OR "emergency health service"[tw] OR "emergency health services"[tw] OR "emergency care"[tw] OR "emergency healthcare"[tw] OR "emergency treatment"[tw] OR "emergency treatments"[tw] OR "emergency department"[tw] OR "emergency departments"[tw] OR "emergency room"[tw] OR "emergency rooms"[tw] OR "emergency ward"[tw] OR "emergency wards"[tw] OR "emergency unit"[tw] OR "emergency units"[tw] OR "emergency hospital"[tw] OR "emergency hospitals"[tw] OR "emergency clinic"[tw] OR "emergency clinics"[tw] OR "emergency setting"[tw] OR "emergency staff"[tw] OR "emergency response" [tw] OR "emergency medical technician" [tw] OR "emergency medical technicians"[tw] OR "paramedic"[tw] OR "paramedics"[tw] OR "ambulance"[tw] OR "ambulances"[tw] OR "ER"[tw] OR "first responder"[tw] OR "first responders"[tw] OR "rescue work"[tw] OR "rescue worker"[tw] OR "rescue workers"[tw] OR "relief work"[tw] OR "relief worker"[tw] OR "relief workers"[tw] OR "firefighter"[tw] OR "firefighters"[tw] OR "fire fighter"[tw] OR "fire fighters" [tw] OR "trauma center" [tw] OR "trauma centers" [tw] OR "trauma unit" [tw] OR "trauma units"[tw] OR "critical care"[tw] OR "critical illness"[tw] OR "critical illnesses"[tw] OR "resuscitation"[tw] OR "shock"[tw] OR "sepsis"[tw] OR "septicemia"[tw] OR "septicaemia"[tw] OR "acute care"[tw] OR "acute disease"[tw] OR "acute diseases"[tw] OR "prehospital"[tw] OR "pre hospital"[tw] OR "wound"[tw] OR "wounds"[tw] OR "triage"[tw] OR "pregnancy complication"[tw] OR "pregnancy complications"[tw] OR "obstetric complication"[tw] OR "obstetric complications"[tw] OR "obstetric emergency"[tw] OR "obstetric emergencies"[tw]

AND

"Access"[tw]) AND ("availability" OR "availabl*" OR "affordab*" OR "cost" OR "distance" OR "spatial" OR "barrier" OR "barriers" OR "quality") AND

LMIC: based on Cochrane Foundation PubMed Filter

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Access terms ('emergency responder' OR 'emergency responders' OR 'emergency doctor' OR 'emergency doctors' OR 'emergency clinician' OR 'emergency clinicians' OR 'emergency physician' OR 'emergency physicians' OR 'emergency personnel' OR 'emergency medical personnel' OR 'emergency service' OR 'emergency services' OR 'emergency medical service' OR 'emergency medical services' OR 'emergency medicine' OR 'emergency health service' OR 'emergency health services' OR 'emergency care' OR 'emergency healthcare' OR 10 'emergency treatment' OR 'emergency treatments' OR 'emergency department' OR 11 'emergency departments' OR 'emergency room' OR 'emergency rooms' OR 'emergency 12 ward' OR 'emergency wards' OR 'emergency unit' OR 'emergency units' OR 'emergency 13 hospital' OR 'emergency hospitals' OR 'emergency clinic' OR 'emergency clinics' OR 14 'emergency setting' OR 'emergency staff' OR 'emergency response' OR 'emergency medical 15 technician' OR 'emergency medical technicians' OR 'paramedic' OR 'paramedics' OR 16 17 'ambulance' OR 'ambulances' OR 'ER' OR 'first responder' OR 'first responders' OR 'rescue work' OR 'rescue worker' OR 'rescue workers' OR 'relief work' OR 'relief worker' OR 'relief 18 19 workers' OR 'firefighter' OR 'firefighters' OR 'fire fighter' OR 'fire fighters' OR 'trauma center' 20 OR 'trauma centers' OR 'trauma unit' OR 'trauma units' OR 'critical care' OR 'critical illness' 21 OR 'critical illnesses' OR 'resuscitation' OR 'shock' OR 'sepsis' OR 'septicemia' OR 22 'septicaemia' OR 'acute care' OR 'acute disease' OR 'acute diseases' OR 'prehospital' OR 23 'pre hospital' OR 'wound' OR 'wounds' OR 'triage' OR 'pregnancy complication' OR 24 'pregnancy complications' OR 'obstetric complication' OR 'obstetric complications' OR 25 'obstetric emergency' OR 'obstetric emergencies') 26 AND 'Access' AND ('availability' OR 'availabl*' OR 'affordab*' OR 'cost' OR 'distance' OR 27 'spatial' OR 'barrier' OR 'barriers' OR 'quality') AND ('emergency responder' OR 'emergency 28 responders' OR 'emergency doctor' OR 'emergency doctors' OR 'emergency clinician' OR 29 'emergency clinicians' OR 'emergency physician' OR 'emergency physicians' OR 'emergency 30 personnel' OR 'emergency medical personnel' OR 'emergency service' OR 'emergency 31 services' OR 'emergency medical service' OR 'emergency medical services' OR 'emergency 32 medicine' OR 'emergency health service' OR 'emergency health services' OR 'emergency care' 33 OR 'emergency healthcare' OR 'emergency treatment' OR 'emergency treatments' OR 34 'emergency department' OR 'emergency departments' OR 'emergency room' OR 'emergency 35 rooms' OR 'emergency ward' OR 'emergency wards' OR 'emergency unit' OR 'emergency units' 36 37 OR 'emergency hospital' OR 'emergency hospitals' OR 'emergency clinic' OR 'emergency 38 clinics' OR 'emergency setting' OR 'emergency staff' OR 'emergency response' OR 'emergency 39 medical technician' OR 'emergency medical technicians' OR 'paramedic' OR 'paramedics' OR 40 'ambulance' OR 'ambulances' OR 'ER' OR 'first responder' OR 'first responders' OR 'rescue 41 work' OR 'rescue worker' OR 'rescue workers' OR 'relief work' OR 'relief worker' OR 'relief 42 workers' OR 'firefighter' OR 'firefighters' OR 'fire fighter' OR 'fire fighters' OR 'trauma center' OR 43 'trauma centers' OR 'trauma unit' OR 'trauma units' OR 'critical care' OR 'critical illness' OR 44 'critical illnesses' OR 'resuscitation' OR 'shock' OR 'sepsis' OR 'septicemia' OR 'septicaemia' 45 OR 'acute care' OR 'acute disease' OR 'acute diseases' OR 'prehospital' OR 'pre hospital' OR 46 'wound' OR 'wounds' OR 'triage' OR 'pregnancy complication' OR 'pregnancy complications' 47 OR 'obstetric complication' OR 'obstetric complications' OR 'obstetric emergency' OR 'obstetric 48 emergencies') AND ('developing country' OR 'middle income country' OR 'middle income 49 countr*' OR 'low income country' OR 'global medicine' OR 'third world' OR 'underserved countr*' 50 OR 'resource limited country' OR 'Imic*' OR 'low income economy' OR 'middle income economy' 51 OR 'underdeveloped countr*' OR 'underdeveloped economy' OR 'poor countr*' OR 'poor nation' 52 OR 'world health' OR 'middle-income countr*' OR 'transitional countr*' OR 'lower middle income 53 countr*' OR 'upper middle income' OR 'less developed countr*' OR 'lesser developed countr*' 54 OR 'developing countr*' OR 'developing nation' OR 'lower-middle income countr*' OR 'upper-55 middle income countr*' OR 'low-income countr*' OR 'deprived countr*' OR 'low gdp' OR 'lami 56 57 58

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countr*' OR 'poorer nation' OR 'under served countr*' OR 'under served nation' OR 'lower income population' OR 'low income population' OR 'developing world' OR 'africa' OR 'asia' OR 'caribbean' OR armenian OR aruba OR byelorussian OR belarus OR belorussian OR belorussia OR bosnia OR herzegovina OR hercegovina OR brasil OR 'comoro islands' OR comores OR mayotte OR zaire OR 'ivory coast' OR 'slovak republic' OR 'french somaliland' OR 'east timur' OR 'timor leste' OR 'united arab republic' OR 'gabonese republic' OR gaza OR 'georgia republic' OR 'georgian republic' OR 'gold coast' OR guiana OR maldives OR 'isle of man' OR kazakh OR kiribati OR kirghizia OR 'kyrgyz republic' OR kirghiz OR kirgizstan OR basutoland OR 'malagasy republic' OR malaya OR malay OR sabah OR sarawak OR nyasaland OR 'marshall islands' OR 'agalega islands' OR moldovia OR moldovian OR ifni OR myanma OR burma OR 'northern mariana islands' OR muscat OR palestine OR philipines OR philipines OR philippines OR rumania OR roumania OR russian OR ruanda OR 'saint kitts' OR 'st kitts' OR nevis OR 'st lucia' OR 'st vincent' OR 'samoan islands' OR 'navigator island' OR 'navigator islands' OR 'sao tome' OR ceylon OR 'solomon islands' OR surinam OR tadzhikistan OR tadjikistan OR tadzhik OR 'togolese republic' OR turkmen OR 'soviet union' OR 'union of soviet socialist republics' OR uzbek OR 'new hebrides' OR 'viet nam' OR 'west bank' OR rhodesia OR africa OR 'africa, northern' OR 'africa south of the sahara' OR 'africa, central' OR 'africa, eastern or africa, southern' OR 'africa, western or asia' OR 'asia, central' OR 'asia, southeastern' OR 'asia, western' OR 'caribbean region' OR 'west indies' OR 'south america' OR 'latin america' OR 'central america' OR afghanistan OR albania OR algeria OR 'american samoa' OR angola OR antigua OR barbuda OR argentina OR armenia OR azerbaijan OR bahrain OR bangladesh OR barbados OR benin OR byelarus OR belize OR bhutan OR bolivia OR 'bosnia-herzegovina' OR botswana OR brazil OR bulgaria OR 'cape verde' OR 'central african republic' OR chad OR chile OR china OR colombia OR comoros OR congo OR 'costa rica' OR 'cote d ivoire' OR croatia OR cuba OR cvprus OR czechoslovakia OR 'czech republic' OR slovakia OR diibouti OR 'democratic republic of the congo' OR dominica OR 'dominican republic' OR 'east timor' OR ecuador OR egypt OR 'el salvador' OR eritrea OR estonia OR ethiopia OR fiji OR gabon OR gambia OR georgia OR ghana OR greece OR grenada OR guatemala OR guinea OR 'guineabissau' OR guam OR guyana OR haiti OR honduras OR hungary OR india OR indonesia OR iran OR irag OR jamaica OR jordan OR kazakhstan OR kenya OR korea OR kosovo OR kyrgyzstan OR laos OR latvia OR lebanon OR lesotho OR liberia OR libya OR lithuania OR macedonia OR madagascar OR malaysia OR malawi OR mali OR malta OR mauritania OR mauritius OR mexico OR micronesia OR 'middle east' OR moldova OR mongolia OR morocco OR mozambigue OR myanmar OR namibia OR nepal OR 'netherlands antilles' OR 'new caledonia' OR nicaragua OR niger OR nigeria OR oman OR pakistan OR palau OR panama OR 'papua new guinea' OR paraguay OR peru OR philippines OR poland OR portugal OR 'puerto rico' OR romania OR russia OR rwanda OR 'saint lucia' OR 'saint vincent' OR grenadines OR samoa OR 'saudi arabia' OR senegal OR serbia OR montenegro OR seychelles OR 'sierra leone' OR slovenia OR 'sri lanka' OR somalia OR 'south africa' OR sudan OR suriname OR swaziland OR syria OR tajikistan OR tanzania OR thailand OR togo OR tonga OR trinidad OR tobago OR tunisia OR turkey OR turkmenistan OR uganda OR ukraine OR uruguay OR ussr OR uzbekistan OR vanuatu OR venezuela OR vietnam OR yemen OR yugoslavia OR zambia OR zimbabwe OR 'burkina faso' OR 'upper volta' OR burundi OR urundi OR cambodia OR 'khmer republic' OR kampuchea OR cameroon OR cameroons OR 'cameron or' AND camerons OR 'cape verde' OR 'central african republic' OR 'pacific region' OR 'pacific island'

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Web of Science:

Date of Initial Search: Feb 6, 2020; Date of second search: Nov 30 2020 TS= 'Access' AND ('availability' OR 'availabl*' OR 'affordab*' OR 'cost' OR 'distance' OR 'spatial' OR 'barrier' OR 'barriers' OR 'quality') ANDAND

(emergency responder" OR "emergency responders" OR "emergency doctor" OR "emergency doctors" OR "emergency clinician" OR "emergency clinicians" OR "emergency physician" OR "emergency physicians" OR "emergency personnel" OR "emergency medical personnel" OR "emergency service" OR "emergency services" OR "emergency medical service" OR "emergency medical services" OR "emergency medicine" OR "emergency health service" OR "emergency health services" OR "emergency care" OR "emergency healthcare" OR "emergency treatment" OR "emergency treatments" OR "emergency department" OR "emergency departments" OR "emergency room" OR "emergency rooms" OR "emergency ward" OR "emergency wards" OR "emergency unit" OR "emergency units" OR "emergency hospital" OR "emergency hospitals" OR "emergency clinic" OR "emergency clinics" OR "emergency setting" OR "emergency staff" OR "emergency response" OR "emergency medical technician" OR "emergency medical technicians" OR "paramedic" OR "paramedics" OR "ambulance" OR "ambulances" OR "ER" OR "first responder" OR "first responders" OR "rescue work" OR "rescue worker" OR "rescue workers" OR "relief work" OR "relief worker" OR "relief workers" OR "firefighter" OR "firefighters" OR "fire fighter" OR "fire fighters" OR "trauma center" OR "trauma centers" OR "trauma unit" OR "trauma units" OR "critical care" OR "critical illness" OR "critical illnesses" OR "resuscitation" OR "shock" OR "sepsis" OR "septicemia" OR "septicaemia" OR "acute care" OR "acute disease" OR "acute diseases" OR "prehospital" OR "pre hospital" OR "wound" OR "wounds" OR "triage" OR "pregnancy complication" OR "pregnancy complications" OR "obstetric complication" OR "obstetric complications" OR "obstetric emergency" OR "obstetric emergencies") AND

TS=("developing countr*" OR "developing nation*" OR "developing population*" OR "less developed countr*" OR "less developed nation*" OR "less developed population*" OR "lesser developed countr*" OR "lesser developed nation*" OR "lesser developed population*" OR "lesser developed world" OR "least developed countr*" OR "least developed nation*" OR "least developed population*" OR "least developed world" OR "under developed countr*" OR "under developed nation*" OR "under developed population*" OR "under developed world" OR "underdeveloped countr*" OR "underdeveloped nation*" OR "underdeveloped population*" OR "underdeveloped world" OR "middle income countr*" OR "middle income nation*" OR "middle income population*" OR "low income countr*" OR "low income nation*" OR "low income population" OR "low income population*" OR "lower income countr*" OR "lower income nation*" OR "lower income population*" OR "underserved countr*" OR "underserved nation*" OR "underserved population*" OR "underserved world" OR "under served countr*" OR "under served nation*" OR "under served population*" OR "under served world" OR "deprived countr*" OR "deprived nation*" OR "deprived population*" OR "deprived world" OR "poor countr*" OR "poor nation*" OR "poor population*" OR "poor world" OR "poorer countr*" OR "poorer nation*" OR "poorer population*" OR "poorer world" OR "developing econom*" OR "less developed econom*" OR "lesser developed econom*" OR "under developed econom*" OR "underdeveloped econom*" OR "middle income econom*" OR "low income econom*" OR "lower income econom*" OR "low gdp" OR "low gnp" OR "low gross domestic" OR "low gross national" OR "lower gdp" OR "lower gnp" OR "lower gross domestic" OR "lower gross national" OR Imic OR Imics OR "third world" OR "lami countr*" OR "transitional countr*" OR Africa OR Asia OR Caribbean OR West Indies OR South America OR Latin America OR Central America OR Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR

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OR "emergency medical technician" OR "emergency medical technicians" OR "paramedic" OR "paramedics" OR "ambulance" OR "ambulances" OR "ER" OR "first responder" OR "first responders" OR "rescue work" OR "rescue worker" OR "rescue workers" OR "relief work" OR "relief worker" OR "relief workers" OR "firefighter" OR "firefighters" OR "fire fighter" OR "fire fighters" OR "trauma center" OR "trauma centers" OR "trauma unit" OR "trauma units" OR "critical care" OR "critical illness" OR "critical illnesses" OR "resuscitation" OR "shock" OR "sepsis" OR "septicemia" OR "septicaemia" OR "acute care" OR "acute disease" OR "acute 10 diseases" OR "prehospital" OR "pre hospital" OR "wound" OR "wounds" OR "triage" OR 11 "pregnancy complication" OR "pregnancy complications" OR "obstetric complication" OR 12 "obstetric complications" OR "obstetric emergency" OR "obstetric emergencies") AND 13 ("developing countr*" OR "developing nation*" OR "developing population*" OR "less developed 14 countr*" OR "less developed nation*" OR "less developed population*" OR "lesser developed 15 countr*" OR "lesser developed nation*" OR "lesser developed population*" OR "lesser 16 17 developed world" OR "least developed countr*" OR "least developed nation*" OR "least developed population*" OR "least developed world" OR "under developed countr*" OR "under 18 developed nation*" OR "under developed population*" OR "under developed world" OR 19 20 "underdeveloped countr*" OR "underdeveloped nation*" OR "underdeveloped population*" OR 21 "underdeveloped world" OR "middle income countr*" OR "middle income nation*" OR "middle 22 income population*" OR "low income countr*" OR "low income nation*" OR "low income 23 population" OR "low income population*" OR "lower income countr*" OR "lower income nation*" 24 OR "lower income population*" OR "underserved countr*" OR "underserved nation*" OR 25 "underserved population*" OR "underserved world" OR "under served countr*" OR "under 26 served nation*" OR "under served population*" OR "under served world" OR "deprived countr*" 27 OR "deprived nation*" OR "deprived population*" OR "deprived world" OR "poor countr*" OR 28 "poor nation*" OR "poor population*" OR "poor world" OR "poorer countr*" OR "poorer nation*" 29 OR "poorer population*" OR "poorer world" OR "developing econom*" OR "less developed 30 econom*" OR "lesser developed econom*" OR "under developed econom*" OR 31 "underdeveloped econom*" OR "middle income econom*" OR "low income econom*" OR "lower 32 income econom*" OR "low gdp" OR "low gnp" OR "low gross domestic" OR "low gross national" 33 OR "lower gdp" OR "lower gnp" OR "lower gross domestic" OR "lower gross national" OR Imic 34 OR Imics OR "third world" OR "lami countr*" OR "transitional countr*" OR Africa OR Asia OR 35 Caribbean OR West Indies OR South America OR Latin America OR Central America OR 36 37 Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR 38 Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR 39 Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR 40 Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brasil OR 41 Brazil OR Bulgaria OR Burkina Faso OR Burkina Fasso OR Upper Volta OR Burundi OR Urundi 42 OR Cambodia OR Khmer Republic OR Kampuchea OR Cameroon OR Cameroons OR 43 Cameron OR Camerons OR Cape Verde OR Central African Republic OR Chad OR Chile OR 44 China OR Colombia OR Comoros OR Comoro Islands OR Comores OR Mayotte OR Congo 45 OR Zaire OR Costa Rica OR Cote d'Ivoire OR Ivory Coast OR Croatia OR Cuba OR Cyprus OR 46 Czechoslovakia OR Czech Republic OR Slovakia OR Slovak Republic OR Djibouti OR French 47 Somaliland OR Dominica OR Dominican Republic OR East Timor OR East Timur OR Timor 48 Leste OR Ecuador OR Egypt OR United Arab Republic OR El Salvador OR Eritrea OR Estonia 49 OR Ethiopia OR Fiji OR Gabon OR Gabonese Republic OR Gambia OR Gaza OR Georgia 50 Republic OR Georgian Republic OR Ghana OR Gold Coast OR Greece OR Grenada OR 51 Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary 52 OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Isle of Man OR Jamaica OR Jordan 53 OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR 54 Kirghizia OR Kyrgyz Republic OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Latvia OR 55 Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya OR Lithuania OR Macedonia OR 56 57 58

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	Adewole	Adewole OA, Fadeyibi IO, Kayode MO, Giwa SO, Shoga MO, Adejumo AO, Ademiluyi SA. Ambulance services of	Nigeria	African	Low	Lagos State	Regional	Urban	nal Qual I for	Cross sectional	2001- 2006	32,774	Cases
8 9		Lagos state, Nigeria: a six-year (2001-2006) audit. West Afr							ы Б ш Б	ocononiai	2000		
10	Ahmed	J Med. 2012;31:3–7. Ahmed S, Adams AM, Islam R, Hasan SM, Panciera R.	Bangladesh	South-Eas	tlower-	Dhaka	Regional	Urban	April ⁵¹ Enseit uses re	Cross	2014	N/A	N/A
11	/ inned	Impact of traffic variability on geographic accessibility to 24/7		Asia	middle	Briana	regional	orban	2023 Jigne	sectional	2014	14/7	
12		emergency healthcare for the Urban poor: A GIS study in Dhaka, Bangladesh. PLoS One. 2019;14(9):e0222488.											
₃ 13	Ali	Ali M, Miyoshi C, Ushijima H. Emergency medical services in	Pakistan	South-Eas	tLower-	Islamabad	Regional	Urban	ର୍ଥ୍ୟୁ କିମ୍ବ	Mixed	2000-	N/A	N/A
14		Islamabad, Pakistan: a public-private partnership. Public		Asia	middle				t Su	methods	2001		
15 4	Alibhai	Health. 2006;120:50–7. Alibhai A, Hendrikse C, Bruijns SR. Poor access to acute	Multinational	African	N/A	N/A	International	N/A	. Downloaded ment Superieu ed to text and o	Descriptive	2016	392	Conference
16		care resources to treat major trauma in low- and middle-							rieu nd o	Survey			delegates
17 19		income settings: A self-reported survey of acute care providers. Afr J Emerg Med. 2019;9(Suppl):S38-S42.							froi dat				
18 ⁵ 19	Amparo	Amparo ACB, Jayme SI, Roces MCR, Quizon MCL,	Philippines	Western	Lower-	Nueva	Regional	Both	l from ur (A data m	Descriptive	2017	3537	Households
20		Mercado MLL, Dela Cruz MPZ, Licuan DA, Villalon EES 3rd, Baguilod MS, Hernandez LM, Taylor LH, Nel LH. The		Pacific	middle	Vizcaya, Palawan and				survey			
20		evaluation of Animal Bite Treatment Centers in the				Tarlac Districts	;		ng,				
22		Philippines from a patient perspective. PLoS One. 2018 Jul							≥ 3				
22	Anest	26;13(7):e0200873. Anest T, Stewart de Ramirez S, Balhara KS, Hodkinson P,	South Africa	African	Upper-	Cape Town	Regional	Urban) .) . ing, Al trai	Descriptive	2013	24	Interviewed
24		Wallis L, Hansoti B. Defining and improving the role of			middle		- 5		ining,	Interview			individuals
25		emergency medical services in Cape Town, South Africa. Emerg Med J. 2016;33(8):557-61.							ining, and si				
	Anyumba	Anyumba G. Thohoyandou's central business district and the		African	Upper-	Thohoyandou	Regional	Urban		Cross	2019	N/A	N/A
27		hypothetical accessibility challenges for emergency services. Jamba. 2019;11(2):681.			middle				d si	sectional			
8 ²⁸ 29	Aries		Ghana	African	Low	Brong Ahafo	Local	Urban	n∕ on≞June B I similar tec	Mixed	2005	46	Patients
		Fracture treatment by bonesetters in central Ghana: patients				Region			Jur ar t	methods			
30 21		explain their choices and experiences. Tropical Medicine & InterNational Health 12(4): 564–574.							ne 1 iech				
31 9 32	Bachani	Bachani AM, Botchey I, Paruk F, Wako D, Saidi H, Aliwa B,		African	Lower-	Kenya	National	N/A		Cross	2011	N/A	N/A
33		et al. Nine-point plan to improve care of the injured patient: A case study from Kenya. Surgery. 2017;162(6S):S32-S44.	١		middle				une 1脑 2025 여 r technologie	sectional			
~ 4	Bast		Honduras	Americas	Lower-	Honduras	National	N/A	Jies Qual	Descriptive	2018	N/A	N/A
35	Dasi	Honduras. Prehosp Disaster Med. 2018;33(6):637-9.	nonuuras	Americas	middle	Tionuuras	National	IN/A	- Qua Ag	Interview	2010	N/A	IN/A
1 3 6	Bhopal	Bhopal SS, Halpin SJ, Gerein N. Emergency obstetric	Sierra Leone	African	Low	Kambia region	Regional	Rural	Bo ff	Mixed	2013	N/A	N/A
37		referral in Rural Sierra Leone: what can motorbike				C C	0		Boffice	methods			
38		ambulances contribute? A mixed-methods study. Matern Child Health J. 2013;17:1038–43.							Bib				
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12 4 5	Bigdeli	Bigdeli M, Khorasani-Zavareh D, Mohammadi R. Pre- hospital care time intervals among victims of road traffic injuries in Iran. A cross-sectional study. Bmc Public Health. 2010;10.	Iran	Eastern Mediterran ean	Upper- middle	Urmia, Iran	Regional	Urban	220067884 on Quido 67884 on Quido 67884 Quido 67884 on Quido 67884 On Quido 67884 On Quido 67884	Cross sectional	2005- 2007	N/A	N/A
19 7 8	Broccoli	Broccoli MC, Calvello EJ, Skog AP, Wachira B, Wallis LA. Perceptions of emergency care in Kenyan communities lacking access to formalised emergency medical systems: a	Kenya	African	Lower- middle	Kenya	National	N/A	ng for	Descriptive Interview	2015	528	Focus group members
14 10 11	Broccoli	Community-based perceptions of emergency care in Zambian communities lacking formalised emergency	Zambia	African	Lower- middle	Zambia	National	N/A	April 2023. Bownloaded Edseignerdent Superie uses related to text and	Descriptive Interview	2016	183	Focus group members
152 13 14	Burke	medicine systems. Emerg Med J. 2016;33(12):870-5. Burke TF, Hines R, Ahn R, Walters M, Young D, Anderson RE, et al. Emergency and urgent care capacity in a resource-limited setting: an assessment of health facilities in	Kenya	African	Lower- middle	Western Kenya	Regional	Both	13. Bown	Descriptive Interview	2013- 2014	60	Key informants
15 16 16 17	Chunga	western Kenya. BMJ Open. 2014;4(9):e006132. Chunga R, Bruijns SR, Hendrikse C. Access to acute care resources in various income settings to treat new-onset stroke: A survey of acute care providers. Afr J Emerg Med.		N/A	N/A	N/A	International	N/A	lloaded f superieu xt and d	Descriptive Survey	2016	382	Healthcare Providers
18 ¹ 19 20	Comery	2019;9(2):77-80. Comery B, Perry WRG, Young S, Dare A, Matalavea B, Bissett IP, Windsor JA. Delivery of surgical care in Samoa: perspectives on capacity, barriers and opportunities by local	Samoa	Western Pacific	Lower- middle	Samoa	National		l fron <u>€http</u> ur (ASES) data minir	Descriptive Interview	2016	N/A	Key informants
21 ¹ 82	Coyle	providers. ANZ J Surg. 2020 Oct;90(10):1910-1914.	Sierra Leone	African	Low	Freetown, Sierra Leone	Regional	Urban	.∥bn , ∕	Cross sectional	2015	N/A	N/A
23 1294 25	De Wulf	Med. 2015;15(1):2 DeWulf A, Otchi EH, Soghoian S. Identifying priorities for quality improvement at an emergency Department in Ghana.	Ghana	African	Lower- middle	Urban Ghana.	Local	Urban	raining,	Descriptive Survey	5-Jul	18	EU staff members
26 27 28	De Wulf	BMC Emerg Med. 2017;17(1):28. De Wulf A, Aluisio AR, Muhlfelder D, Bloem C. Emergency Care Capabilities in North East Haiti: A Cross-sectional Observational Study. Prehosp Disaster Med.	Haiti	Americas	Low	Fort Liberté District, Haiti	Regional	Rural	giopendomj.com/ on . G Al training, and simila	Cross sectional	2012	N/A	N/A
29 21 30	El Tayeb	2015;30(6):553-9. El Tayeb S, Abdalla S, Van den Bergh G, Heuch I. Use of healthcare services by injured people in Khartoum State,	Sudan	Mediterran	Lower- middle	Sudan	Regional	Urbon		Descriptive Survey	2010	N/A	N/A
31 2 3 2 33	Elbashir	Sudan. InterNational Health. 2015;7(3):183-9. Elbashir K, Gore RJ, Abuaaraki T, Roblin P, Botha M, Yousif M, Ostrovskiys G, Bloem C, James SA. Prehospital emergency care and injury prevention in Sudan. Afr J Emerg		ean African	Low	Sudan	National	N/A	technologies	Cross sectional	2008 - 2014	N/A	N/A
34 2 3 5 36	Emerick	Access to medicines for acute illness in middle income countries in Central America. Rev Saude Publica.	Multinational	Americas	N/A	Central American Countries	International		ataAgence	Cross sectional	2013	2,761	Households
37 2 9 8 39 40 41	Hashtarkhani	2013;47(6):1069-79. Hashtarkhani S, Kiani B, Bergquist R, Bagheri N, VafaeiNejad R, Tara M. An age-integrated approach to improve measurement of potential spatial accessibility to emergency medical services for Urban areas. Int J Health Plann Manage. 2020;35(3):788-98.	Iran	Eastern Mediterran ean	Upper- middle	Mashhad City, Iran	Regional	Urban	ce bibliographique de	Cross sectional	2016	N/A	N/A
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2ම් 4 5	Hodkinson	Hodkinson PW, Pigoga JL, Wallis L. Emergency healthcare needs in the Lavender Hill suburb of Cape Town, South Africa: a cross-sectional, community-based household survey. BMJ Open. 2020;10(1):e033643.	South Africa	African	Upper- middle	Lavender Hill suburb of Cape Town, South Africa	Regional	Urban	22a067884 or G ht, including	Descriptive Survey	2018	2754	Interviewed individuals
268 7 8	Hsia	Hsia RY, Mbembati N/A, Macfarlane S, Kruk ME. Access to emergency and surgical care in sub-Saharan Africa: the infrastructure gap. Health Policy Plan. 2012;27(3):234-44.	Multinational	African	N/A	Ghana, Kenya Rwanda, Tanzania, Uganda	, International	N/A	ng for	Cross sectional	2012	N/A	N/A
2 7 10 11	Jacobs	Jacobs B, Men C, Sam OS, Postma S. Ambulance services as part of the district health system in low-income countries: a feasibility study from Cambodia. InterNational Journal of Health Planning and Management. 2016;31(4):414-29.	Cambodia	South-Eas Asia	tLower- middle	Cambodia	National	N/A	Ap <u>e</u> l 2023. Eoseigner uses relate	Descriptive Interview	2013	N/A	N/A
28 13	Khan	Khan AN, Rubin DH. 2003. InterNational pediatric emergency care: establishment of a new specialty in a	Kosove	European Region	Upper- middle	Pristina University	Local	Urban	d to	Cross sectional	2002	N/A	N/A
14 295 16	Khan	developing country. Pediatric Emergency Care 19(3): 0181 Khan A, Zafar H, Naeem SN, Raza SA. Transfer delay and in-hospital mortality of trauma patients in Pakistan. Int J Surg. 2010;8:155–8.	Pakistan	South-Eas Asia	tLower- middle	Hospital Aga Khan University Hospital,	Local	Urban	Superie Superie	Cross sectional	1998- 2005	N/A	N/A
17 ³ 98 19 20	Kirsch	Kirsch T, Hilwig W, Holder Y, Smith G, Pooran S, Edwards R. 1995. Epidemiology and practice of emergency medicine in a developing country. Annals of Emergency Medicine 26(3): 361–367.		Americas	Lower- middle	Karachi Port of Spain,	Local	Urban	d from http://tor eur@ABES) ط I data mining, <i>i</i>	Descriptive Interview	N/A	N/A	N/A
³ 21 22 23	Kumar	Kumar S, Chaudhary S, Kumar A, Agarwal AK, Misra MC. Trauma care - a participant observer study of trauma centers at Delhi, Lucknow and Mumbai. Indian J Surg. 2009;71:133- 41.		South-Eas Asia	stLower- middle	Delhi, Lucknow, Mumbai	Regional	Urban	ng, Al tra	Cross sectional	2009	N/A	N/A
3224 25 26	Levine	Levine AC, Presser DZ, Rosborough S, Ghebreyesus TA, Davis MA. Understanding barriers to emergency care in low- income countries: view from the front line. Prehosp Disaster Med. 2007;22(5):467-70.	Ethiopia	African	Low	Tigray	Regional	Rural	Al training, and	Descriptive Survey	2006	N/A	N/A
3 <u>2</u> 7 28 29	Luo	Luo W, Yao J, Mitchell R, Zhang X. Spatiotemporal access to emergency medical services in Wuhan, China: accounting for scene and transport time intervals. Int J Health Geogr. 2020;19(1):52		Western Pacific	Upper- middle	Wuhan	Regional	Urban	simi on	Cross sectional	2020	N/A	N/A
3 3 40 31	Macharia	Macharia WM, Njeru EK, Muli-Musiime F, Nantulya V. Severe road traffic injuries in Kenya, quality of care and access. Afr Health Sci. 2009;9(2):118-24.	Kenya	African Region	Lower- middle	Kenya	National	N/A		Cross sectional	1997- 1998	N/A	N/A
352 33 33	Mahmood	Mahmood KT, Amin F, Ayub H, Yaqoob M, Zaka M. Management of the patient from the site of accident to the hospital/ pre-hospital care. J Pharm Sci Res. 2010;2:804–8.	Pakistan	South-Eas Asia	t Lower- middle	Pakistan	National	N/A	2025 Digi	Cross sectional	2010	N/A	N/A
34 365 36 37 38	Mathew	Mathew A, Abdullakutty J, Sebastian P, Viswanathan S, Mathew C, Nair V, et al. Population access to reperfusion services for ST-segment elevation myocardial infarction in Kerala, India. Indian Heart J. 2017;69 Suppl 1(Suppl 1):S51- S6.	India	South-Eas Asia	tLower- middle	Kerala	Regional	Urban	atant Quadgence Bit	Cross sectional	2017	N/A	N/A
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1 2 3 7 4 5 6 7	Mock	Mock C, nii-Amon-Kotei D, Maier R. 1997. Low utilization of formal medical services by injured persons in a developing nation: health service data underestimate the importance of trauma. The Journal of Trauma: Injury, Infection, nd Critical Care 42(3): 504–513.	Ghana	African	Lower- middle	Ghana	National	N/A	136/bmjopen-202حص67884 on 17 ح cted by copyright, including for	Descriptive Interview	1995	21105	Interviewed individuals
38 9 10	Mock	Mock C, Ofosu A, Gish O. 2001. Utilization of district health services by injured persons in a Rural area of Ghana. The InterNational Journal of Health Planning and Management 16: 19–32.	Ghana	African	Lower- middle	Ghana	National	N/A	aApril 2 Ensei uses n	Descriptive Interview	1995	9442	interviewed individuals
3b1 12 13 14	Mock	Mock C, Nguyen S, Quansah R, Arreola-Risa C, Viradia R, Joshipura M. 2006. Evaluation of trauma care capabilities in four countries using the WHO-IATSIC Guidelines for essential trauma care. World Journal of Surgery 30: 946– 956.	Multinational	N/A	N/A	Mexico, Vietnam, India Ghana	International	N/A	2033. Downloaded eignement Superieu related to text and	Descriptive Interview	2006	N/A	N/A
405 16 17 18	Mohan	Mohan B, Bansal R, Dogra N, Sharma S, Chopra A, Varma S, et al. Factors influencing prehospital delay in patients presenting with ST-elevation myocardial infarction and the impact of prehospital electrocardiogram. Indian Heart J. 2018;70 Suppl 3(Suppl 3):S194-S8.	India	South-Eas Asia	t Lower- middle	Punjab	Regional	Urban	from Jr (A data	Cross sectional	2015	619	Patients
419 20 21	Mould- Millman	Mould-Millman NK, Oteng R, Zakariah A, Osei-Ampofo M, Oduro G, Barsan W, et al. Assessment of Emergency Medical Services in the Ashanti Region of Ghana. Ghana Med J. 2015;49(3):125-35.	Ghana	African	Lower- middle	Ashanti Regio	nRegional	Urban	natp:// 30译S). mining	Cross sectional	2012	N/A	N/A
422 23 24 25	Mould- Millman	Mould-Millman NK, Rominski SD, Bogus J, Ginde AA, Zakariah AN, Boatemaah CA, et al. Barriers to Accessing Emergency Medical Services in Accra, Ghana: Development of a Survey Instrument and Initial Application in Ghana. Glob Health Sci Pract. 2015;3(4):577-90.		African	Lower- middle	Accra	Regional	N/A	bmtopen.bmj.com/ د م ا, Al training, and sii	Cross sectional	2013	468	Survey participants
426 27 28	Mould- Millman		Multinational	African	N/A	N/A	International	N/A	om/ on Quan/ on and simi	Cross sectional	2013- 2014	N/A	N/A
4 4 9 30 31	Nagata	Nagata T, Takamori A, Kimura Y, Kimura A, Hashizume M, Nakahara S. Trauma center accessibility for road traffic injuries in Hanoi, Vietnam. J Trauma Manag Outcomes. 2011:5:11.	Vietnam	South-Eas Asia	t Lower- middle	Hanoi	Regional	Urban	n/ on June 11, ភ្នំដ Q I similar technolo	Cross sectional	2006	N/A	N/A
4 <u>3</u> 2 33 34	Natuzzi	Natuzzi ES, Kushner A, Jagilly R, Pickacha D, Agiomea K, Hou L, Houasia P, Hendricks PL, Ba'erodo D. Surgical care in the Solomon Islands: a road map for universal surgical care delivery. World J Surg. 2011 Jun;35(6):1183-93.		Western Pacific	Lower- middle	Outer Islands	Regional	Rural	, 2025 at / Qu ologies.	Cross sectional	2009- 2010	9	Health facilities
36 37	Nielsen	Nielsen K, Mock C, Joshipura M, Rubiano AM, Zakariah A, Rivara F. Assessment of the status of prehospital care in 13 low- and middle-income countries. Prehosp Emerg Care. 2012;16:381–9.	Multinational	N/A	N/A	13 LMICs in Africa, Asia, and Latin America	International	N/A	Qu dence B	Descriptive Survey	2009– 2010	N/A	N/A
40 41 42 43	Ntabaye	Ntabaye MK, Scheutz F, Poulsen S. 1998. Household survey of access to and utilization of emergency oral health care services in Rural Tanzania. East African Medical Journal 75(11): 649–653.	Tanzania	African	Lower- middle	Rungwe district, Mbeya region	Regional	Rural	sitaliographique de	Descriptive Survey	1998	1,106	Households
44 45 46 47		For peer review of	only - http://	bmjopen.	.bmj.com/s	ite/about/gui	idelines.xht	ml	le I				

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1 2									oen-20% opyrig				
48 4 5 6	Ouma	Ouma PO, Maina J, Thuranira PN, Macharia PM, Alegana VA, English M, et al. Access to emergency hospital care provided by the public sector in sub-Saharan Africa in 2015: a geocoded inventory and spatial analysis. Lancet Glob Health. 2018;6(3):e342-e50.	MutiNational	African	N/A	N/A	International	N/A	136/bmjopen-20225067884 or cted by copyright, including	Cross sectional	2018	N/A	N/A
40 8 9 10 11	Phillips	Phillips G, Creaton A, Airdhill-Enosa P, Toito'ona P, Kafoa B O'Reilly G, Cameron P. Emergency care status, priorities and standards for the Pacific region: A multiphase survey and consensus process across 17 different Pacific Island Countries and Territories. Lancet Reg Health West Pac. 2020 Aug;1:100002.	,Multinational	Western Pacific	N/A	17 regional countries	International	N/A	∙on∄7 April 2023∋ D B Enseign@me ing for uses related	Descrriptive interviews & surveys		17	Key informants
⁵ θ ₂ 13 14 15	Pigoga	Pigoga JL, Joiner AP, Chowa P, Luong J, Mhlanga M, Reynolds TA, et al. Evaluating capacity at three government referral hospital emergency units in the kingdom of Eswatini using the WHO Hospital Emergency Unit Assessment Tool. BMC Emerg Med. 2020;20(1):33.	Eswantini	African	Lower- middle	Eswantini	National	N/A	23 Downloaded noment Superieu ated to text and d	Cross sectional	2018	11`	Key informants
⁵ 16 17	Radjou	Radjou AN, Mahajan P, Baliga DK. Where do I go? A trauma victim's plea in an informal trauma system. J Emerg Trauma Shock. 2013;6:164–70.		South-Eas Asia	tLower- middle	Puducherry territory	Regional	Urban	ded from लोeur (अप्रे and data	Cross sectional	2009- 2010	N/A	N/A
5128 19 20	Razzak	Razzak J, Cone D, Rehmani R. 2001. Emergency medical services and cultural determinants of an emergency in Karachi, Pakistan. Prehospital Emergency Care 5(3): 312–316.	Pakistan	South-Eas Asia	t Lower- middle	Karachi	Regional	Urban	on http: (ABES) Ita minin	Descriptive Interview	2001	N/A	N/A
5&1 22 23	Ro	Ro YS, Shin SD, Jeong J, Kim MJ, Jung YH, Kamgno J, et al. Evaluation of demands, usage and unmet needs for emergency care in Yaounde, Cameroon: a cross-sectional study. Bmj Open. 2017;7(2).	Cameroon	African	Lower- middle	Yaoundé	Regional	Urban	 g, Al trai	Cross sectional	2017	658	Households
5 4 4 25 26 27	Rocha	Rocha TAH, da Silva NC, Amaral PV, Barbosa ACQ, Rocha JVM, Alvares V, et al. Addressing geographic access barriers to emergency care services: a National ecologic study of hospitals in Brazil. Int J Equity Health. 2017;16(1):149.	Brazil	Americas	Upper- middle	Brazil	National	N/A	http://amjopen_amj.com/ BES) .G mining, Al training, and s	Cross sectional	2017	N/A	N/A
5288 29 30	Rocha	Rocha TAH, da Silva NC, Amaral PV, Barbosa ACQ, Rocha JVM, Alvares V, et al. Access to emergency care services: a transversal ecological study about Brazilian emergency health care network. Public Health. 2017;153:9-15.		Americas	Upper- middle	Brazil	National	N/A	imilar tec	Cross sectional	2017	N/A	N/A
58)1 32 33	Roy	Roy N, Murlidhar V, Chowdhury R, Patil SB, Supe PA, Vaishnav PD, Vatkar A. Where there are no emergency medical services-prehospital care for the injured in Mumbai, India. Prehospital Disaster Med. 2010;25:145–51.	India	South-Eas Asia	t Lower- middle	Mumbai	Local	Urban	ਸ਼ੀ, 2025 Qua chnologie	Cross sectional	2005	170	Patients
5 3 4 35 36	Scolari	Scolari GAS, Rissardo LK, Baldissera VDA, Carreira L. Emergency care units and dimensions of accessibility to health care for the elderly. Rev Bras Enferm. 2018;71 Suppl†2:811-7.	Brazil	Americas	Upper- middle	Brazil	National	N/A	es. Quar Agencant Quant	Descriptive Survey	2018	N/A	N/A
38 39 40 41 42 43	Sheikhbardsii i	Sheikhbardsiri H, Esamaeili Abdar Z, Sheikhasadi H, Ayoubi Mahani S, and Sarani A. Observance of patients' rights in emergency department of educational hospitals in south- east Iran. International Journal of Human Rights in Healthcare. 2020; 13 (5):435-444.	Iran	Eastern Mediterran ean	Upper- middle	Kerman	Regional	Urban	ce Bibliographique de l Q	Descriptive survey	2018	382	Patients
44 45 46 47		For peer review of	only - http://	'bmjopen.	bmj.com/s	ite/about/gu	idelines.xhti	ml	Ye I				

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1 2									oen-20; opyrig				
4		Siddiqui M, Siddiqui SR, Zafar A, Khan FS. Factors delaying hospital arrival of patients with acute stroke. J Pak Med Assoc. 2008;58:178–82.	Pakistan	South-Eas Asia	tLower- middle	Karachi	Local	Urban	2270678 Quino ht, incl	Cross sectional	2006- 2007	165	Patients
560 7	Sodemann	Sodemann M, Biai S, Jakobsen MS, Aaby P. Knowing a	Guinea- Bissau	African	Low	Guinea-Bissa	u Local	Urban	a06788a on 17	Descriptive Interview	2001	1572	Patients
8 6 10 11	Sohayla		Malaysia	Western Pacific	Upper- middle	Shah Alam	Local	Urban	uses	Descriptive survey	2020	300	Survey participants
		Stein C, Mould-Millman NK, De Vries S, Wallis L. Access to out-of-hospital emergency care in Africa: Consensus conference recommendations. Afr J Emerg Med. 2016;6(3):158-61.	MutiNational	African	N/A	N/A	N/A	N/A	2023ରୁ Downloaded eignement Superieu related to text and	Cross sectional	2015	N/A	N/A
6\$5 16 17	Sultan	Sultan M, Abebe Y, Tsadik AW, Ababa A, Yesus AG, Mould- Millman NK. Trends and barriers of emergency medical service use in Addis Ababa; Ethiopia. BMC Emerg Med. 2019;19(1):28.	Ethiopia	African	Low	Ethiopia	National	N/A	onded fro underieur xt and da	Cross sectional	2017	429	survey participants
	Suriyawongp aisal	Suriyawongpaisal P, Atiksawedparit P, Srithamrongsawad S, Thongtan T. Closing the Equity Gap of Access to Emergency Departments of Private Hospitals in Thailand. Emerg Med Int. 2018;2018:6470319.		South-Eas Asia	t Upper- middle	Thailand	National	N/A	from http:/ ur (ABES) data minin	Cross sectional	2017	20,206	patients
	aisal	Suriyawongpaisal P, Aekplakorn W, Srithamrongsawat S, Srithongchai C, Prasitsiriphon O, Tansirisithikul R. Copayment and recommended strategies to mitigate its impacts on access to emergency medical services under universal health coverage: a case study from Thailand. BMC Health Serv Res. 2016;16(1):606.	Thailand	South-Eas Asia	t Upper- middle	Thailand	National	N/A	http://۲۵mjopen.bmj.۲۵ BES) .C mining, Al training, an	Mixed methods	2012	N/A	N/A
6266 27 28		Tansley G, Schuurman N, Amram O, Yanchar N. Spatial Access to Emergency Services in Low- and Middle-Income Countries: A GIS-Based Analysis. PLoS One. 2015;10(11):e0141113.	Multinational	N/A	N/A	N/A	International	N/A	and similar	Cross sectional	2015	N/A	N/A
30 31	Tansley		Ghana	African	Lower- middle	Ghana	National	N/A		Cross sectional	2016	N/A	N/A
6 3 2 33	Thomson	e	Zimbabwe	African	Lower- middle	Zimbabwe	National	N/A	ne 11, <u>3</u> 025 G technologie	Cross sectional	2005	N/A	N/A
6 3 4 35 36		Treleaven E, Pham TN, Le DN, Brooks TN, Le HT, Partridge JC. Referral patterns, delays, and equity in access to advanced paediatric emergency care in Vietnam. Int J Equity Health. 2017;16(1):215.		Western Pacific	Lower- middle	Hanoi	Local	Urban	S Quent Agencont Quent	Cross sectional	2013	557	Patients
38	Vanderschur en	Vanderschuren M, McKune D. Emergency care facility access in Rural areas within the golden hour?: Western	South Africa	African	Upper- middle	South Africa	Regional	Rural	Qu e nt	Cross sectional	2015	N/A	N/A
39 740 41 42 43	Wen	Cape case study. Int J Health Geogr. 2015;14:5. Wen LS, Char D. Existing infrastructure for the delivery of emergency care in post-conflict Rwanda: an initial descriptive study. Acad Emerg Med. 2011;18:S243.	Rwanda	African	Low	Kigali	Regional	Urban	Bibli <u>æ</u> graphique de l G	Mixed methods	2007	60	Health care workers
44 45 46 47		For peer review of	only - http://	′bmjopen.	.bmj.com/s	ite/about/gu	idelines.xht	ml	e de l				

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1 2									oen-20 opyrig				
72 4 5	Wesson	Wesson HK, Stevens KA, Bachani AM, Mogere S, Akungah D, Nyamari J, Masasabi Wekesa J, Hyder AA. Trauma systems in Kenya: a qualitative analysis at the district level. Qual Health Res. 2015 May;25(5):589-99.	Kenya	African	Lower- middle	Kenya	Regional	Urban	122 20 67884 ^{ent} Quant ght, including	Descriptive Interview	2011	N/A	N/A
79 7 8	WHO/ UNICEF	WHO/UNICEF. Water, Sanitation and Hygiene in Health Care Facilities: Status in Low and Middle Income Countries and Way Forward. Geneva, Switzerland: World Health Organization, 2015.	Multinational	N/A	Lower and middle	54 countries	International	NA	ng Quent ng for	Cross- sectional	1998- 2014	90	Heath care facilities
74 10 11 12	Zaidi	Zaidi SM, Labrique AB, Khowaja S, Lotia-Farrukh I, Irani J, Salahuddin N, et al. Geographic variation in access to dog- bite care in Pakistan and risk of dog-bite exposure in Karachi: prospective surveillance using a low-cost mobile	Pakistan	Eastern Mediterrar ean	Lower- middle	Karachi	Regional	Urban	l 203 seig s rel	Cross sectional	2009- 2011	N/A	N/A
75 ³ 14 15 16	Zimmerman	phone system. PLoS Negl Trop Dis. 2013;7(12):e2574. Zimmerman A, Fox S, Griffin R, Nelp T, Thomaz E, Mvungi M, et al. An analysis of emergency care delays experienced by traumatic brain injury patients presenting to a regional referral hospital in a low-income country. PLoS One.	Tanzania	African	Low	Tanzania	Regional	Urban		Cross sectional	2013- 2017	3209	Patients
-17		2020;15(10):e0240528.	8						d fro d dat				
18 19									rom http://bmjopen.bmj.com/ on June 11, 2025 r (ABES) . lata mining, Al training, and similar technologic				
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3		Individual access measures and ou	tcomes by article.
Reference 5No.	Author (year)	Measures	Outcomes
<u>ф</u> 7	Adewole (2012)	1. Geographic barriers	1. Rural population has less access, traffic impedes access
7 <u>2</u> 8	Ahmed (2019)	Percent of slums that have	Percent of slums that have
9		1. 1 EU per 50,000 population	1. 12%
10		2. 1 burn unit per 50,000 population	2. 0%
10		Percent of population that lives	Percent of population that lives
12		3. Within 60 minutes of EU	3. 63% e
12 1 ₃ 3		4. Within 60 minutes of burn unit	4. 32%
39 14	Ali (2006)	1. Average response time to accident	1. 10 min
4' 15	Alibhai (2019)	1. Resource issues	1. LMICs have less resources for trauma care
15 1 6	Amparo (2018)	1. Awareness of where to go for care	Percent of population that livesProtected by copyright3.63%4.32%1.10 min1.LMICs have less resources for trauma care1.7.4%2.44.9%1.22.7%2.44.9%3.5.6%1.Dispatchers lack training
17		2. Sought treatment for wounds	2. 44.9%
18			
19		Reasons for not seeking care	
20		1. Cost	1. 22.7% L
21 22		2. Distance	2. 44.9%
23		3. Sought traditional/alternative care	3. 5.6% Q
24	Anest (2016)	1. Training issues	1. Dispatchers lack training
25 26		2. Staffing issues	2. Shortages of physicians and EMS providers
27 28		3. Hospital system issues	 Shortages of physicians and EMS providers Errors in triage, lack of childcare for other children in the household and restrictive hours of clinic operations, multiple transfers
29 30		4. Pre-hospital system issues	4. Lack of transportation, Lack of telephone access and no universa emergency number.
31 32		5. Communication issues	regarding the acuity of the patient, misunderstanding of geography and
33 34		6. Barriers to reaching care	6. Community understanding of how to navigate the health system
35	Anyumba (2019)	1. Drive time from University of Venda Clinic to scene of accident	and emergency conditions 1. 5-7 minutes
36		2. Drive time Tshilidzini Hospital to scene of	2. 8-10 minutes
37 38		accident 3. Drive time from Donald Frazer hospital to	3. 30-45 minutes
39 30	Aries (2007)	scene of accident 1. Reason that patients do not seek hospital	3. 30-49 minutes a .
40	Alles (2007)	care	1. Lack of specialized fracture treatment
41		2. Barrier to prehospital care	2. Lack of resuscitation equipment
42		3. Cost of treatment by a bonesetter	3. Average 13 € (range 0–60 €)
43		4. Cost of hospital treatment	4. 300 € (range 25–800 €).
44		5. Barrier to seeking care	5. Opinion that bonesetters have more expertise.
45		Demographics associated with seeking hospital care	 Patients with compound fractures are more likely to be treated in a hospital.
46	Bachani (2017)	1. Training issues	1. Lack of training of pre-hospital and in-hospital providers
47		2. Resource issues	2. Lack of basic hospital equipment
48 49		3. Pre-hospital system issues	 B-10 minutes 3. 30-45 minutes Lack of specialized fracture treatment Lack of resuscitation equipment Average 13 € (range 0–60 €) 300 € (range 25–800 €). Opinion that bonesetters have more expertise. Patients with compound fractures are more likely to be treated in hospital. Lack of training of pre-hospital and in-hospital providers Lack of basic hospital equipment There was no functioning emergency number or coordinated response system. Lack of sufficient room and staffing
50	Bast (2018)	1. Staffing issues	1. Lack of sufficient room and staffing
51		2. Geographic issues	2. Access to facilities is limited by mountainous terrain.
52		3. Secondary financial strain	3. Not having adequate child care, the inability to miss work, or being too ill to walk.
53 54		4. Pre-hospital system issues	4. Lack of a universal EMS access code.
54 55 56	Bhopal (2013)	1. Barriers to seeking care	 Poor roads, rainy season inaccessibility, no mobile phone coverage, patient must buy petrol and pay driver, Awareness of ambulance service
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2 3		2. Pre-hospital system issues	2. Drivers willing to respond, maintenance i
412 5	Bigdeli (2010)	 Mean transport times from the scene to the hospital for interurban incidents compared to city areas 	1. 17.1 vs. 6.3 minutes
6 ₁₃ 7 8	Broccoli (2015)	 Characteristics that made it easier for patients to access care 	 When patients were dressed well, had a patience, had personal financial resources or in knew a healthcare provider
9 10		2. Barrier to care	2. Many providers were unfriendly towards provide care. Participants were also concerned
11 12		3. Training issues	3. Healthcare providers lack training in the l care.
13		4. Transportation issues	4. Difficulty obtaining transportation, long di travel.
14 15		5. Health system issues	 Lack of emergency care after business h before emergency care is provided and poor m lack of triage
16 17		6. Financial issues	6. High cost of treatment.
18		7. Pre-hospital system issues	 Officers take patients to the police station the hospital, creating delays.
19 20		8. Communication issues	8. Unavailable emergency phone lines
20 21		9. Staffing issues	9. Lack of healthcare provider
		10. Resource issues	10. Lack of resources and critical medication
21 2 23	Broccoli (2016)	1. Barrier to care	1. Lack of accessible healthcare facilities
23 24		2. Communication issues	2. No functional emergency phone number
24		3. Resource issues	 Lack of necessary equipment No standard national protocols for mass
25		4. Health system issues	triage
27		5. Staffing issues	5. Staff shortages
28		6. Training issues	6. Lack of specific training in emergency ca
29		7. Barrier to reaching care	7. The distance to travel to reach a facility
30 31		8. Transportation issues	8. The time it takes for transportation to arrivehicles and poor road conditions
32		9. Financial barriers	9. Money was a barrier when trying to obtai
33			10. Certain patients are required to be seen
34 35 36		10. Systems issues that generate delays	to receiving healthcare, which creates delays. higher-level facility with no care or stabilisation or during transport. Patients and families are re their transportation to the higher-level facility.
37 38		11. Barriers to seeking care	11. Lack of community knowledge about mee emergency care. Participants felt that facility st thought they should be quicker to provide eme
39 45	Burke (2014)	Percent of Level 2 and 3 Trauma facilities that:	Percent of Level 2 and 3 Trauma facilities that:
	()	1. had a specific approach to a trauma patient	1. 0%
41 42		2. refer trauma immediately	2. 87%
42 43		3. provide first aid and then refer trauma	3. 13%
43 44		patients	
44 45		4. are poorly equipped to handle broken bones	4. 70%
43 46		5. had suture and wound care supplies	5. 87%
40		6. had gloves	6. 90%
48		7. had oxygen	7. 23%
49		8. had splinting/casting supplies	8. 10%
50		9. had blood for transfusion	9. 0%
50		10. refer patients with a possible heart attack	10. 100%
52		11. refer patients with a possible heart attack immediately12. treat symptoms and then refer patients with a	11. 60%
53		possible heart attack	12. 27%
54 55		13. check vitals and then refer patients with a	13. 13%
55 56		possible heart attack 14. had sublingual nitroglycerine	14. 3%
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3	15. are ill prepared to handle possible diabetic	15. 93%
4	ketoacidosis (DKA) and must refer all cases	13. 33 //
5	16. had a glucometer	16. 20%
6	17. had insulin	17. 17%
7	18. refer cases of potential sepsis immediately	18. 50%
8	19. provide treatment for cases of potential	19. 37%
9	sepsis without referral 20. did not know an approach to sepsis	20. 13%
10	21. had antibiotics	21. 80%
11	22. had an organised approach to trauma	22. 30%
12	23. are notified in advance of patients arriving to	
13	the hospital	23. 13%
14	Percent of Level 4 and 5 facilities that:	Percent of Level 4 and 5 facilities that:
15	24. had gloves	24. 97%
16 17	25. had suture and wound care materials	25. 93%
17	26. had oxygen	26. 83%
18	27. did not have access to a trained provider who can administer general or Regional	27. 57%
19	anaesthesia	21. 3176
20	28. had morphine	28. 50%
21	29. had a functioning ECG machine	29. 20%
22 23	30. had nitroglycerine	30. 20%
23	31. had a defibrillator	31. 13%
	32. are well prepared to manage DKA	32. 33%
25	33. had a glucometer	33. 93%
26 27	34. had insulin	34. 80%
	35. provided some treatment for sepsis	35. 97%
28	36. had standardised clinical care guidelines	36. 0%
29 30	37. do not have a standardised approach to	37. 70%
31	trauma	
32	 had nitroglycerine and a functioning ECG // machine 	38. 20%
33	39. had a defibrillator	39. 13%
34	Number of Level 5 facilities that:	Percent of Level 5 facilities that had:
35	40. had chest tubes and X-ray capability	40. 100%
36	41. had splinting and casting supplies	41. 80%
37	42. had blood available for transfusion	42. 100%
38	43. gave oxygen to patients with suspected AMI	43. 100%
39	44. gave aspirin to patients with suspected AMI	44. 60%
40	45. gave morphine to patients with suspected	45. 40%
41	AMI 46. gave epinephrine to patients with suspected	
42	AMI	46. 20%
43	47. had vasopressor agents	47. 100%
44	48. had antibiotics	48. 100%
45	Number of Level 4 facilities that:	Percent of Level 4 facilities that had:
46	49. had chest tubes	49. 12%
47	50. had X-ray capability	50. 48%
48	51. had blood available for transfusion	51. 64%
49	52. refer someone presenting with a possible	F2 90%
50	acute myocardial infarction immediately	52. 80%
51	53. stabilize and then refer someone presenting	53 44%
52	with a possible acute myocardial infarction	53. 44%
53	54. provides diagnostic and treatment services	54 0004
54	without referral to someone presenting with a possible AMI	54. 30%
55	55. had vasopressor agents	55. 44%
56	56. had antibiotics	56. 92%
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1 2			
2 316	Chunga (2019)	Percent of respondents that reported	Percent of respondents that reported
4		1. Access to a pre- hospital service in HIC	1. 4%
5		2. Access to a pre- hospital service in LMIC	2. 21%
6 7		3. Access to a national emergency number in HIC	3. 4%
3		 Access to a national emergency number in LMIC 	4. 21%
7	Comery (2020)	1. Lackof symptom awareness	1. Qual
0	,	2. Cost of transport to EC	2. Qual
1		3. EC Facility access to radiology	3. Qual
2		 EC facility access to laboratory 	4. Qual
3		5. Cost of EC	5. Qual
1		6. Cost of Medications	6. Qual
5			7. Qual
<u>à</u>	Coyle (2015)	7. Lack of staff Percent of hospitals with	Percent of hospitals with
3			·
))		1. adult triage training	1. 43%
)		2. pediatric triage training	2. 57%
		3. formal training in adult critical care	3. 86%
<u>2</u> 3		4. in-house acute care courses for continuing education	4. 14%
, I		5. a dedicated EC nurse	5. 71%
5		6. out-of-hours clinician cover	6. 71%
5		7. intravenous (IV) gentamicin	7. 100%
,		8. IV penicillin and quinine	8. 86%
}		9. Oral rehydration solution and IV fluids	9. 100%
)		10. insulin	10. 29%
)		11. equipment required to carry out IV procedures	11. 100%
1		12. oxygen concentrators or cylinders available	12. 43%
<u>}</u> }		in the EC 13. with light unsuitable for clinical examination	13. 57%
ł		14. a system in place to identify ward patients	14. 29%
5		whose clinical condition was deteriorating	
5		 guidelines for paediatric critical care guidelines for adult critical care 	15. 71% 16. 57%
		17. Emergency care guidelines for children	17. 57%
		5 7 5	
)		 Emergency care guidelines for adults Paediatric triage guidelines 	19. 43%
			20. 29%
		 20. adult triage guidelines 21. guidelines for oxygen therapy 	18. 43% 19. 43% 20. 29% 21. 29%
2		22. facilities to check haemoglobin and blood	
3		glucose	22. 100%
Ι		23. ability to measure renal function	23. 71%
5		24. radiography	24. 57%
5		25. had a system in place for delaying regis-	
5		tration and payment until after the receipt of emergency treatment for critically unwell adults	25. 29%
)		26. had a system in place for delaying registration and payment until after the receipt of	26. 43%
) 		emergency treatment for critically unwell children	Dereent of public facilities with
		Percent of public facilities with	Percent of public facilities with
<u>)</u>		27. adult triage training	27. 0
3		28. pediatric triage training	28. 2
ł -		Percent of private facilities with	Percent of private facilities with
5		29. resuscitation facilities for adults	29. 100%
5		30. all of the six infrastructure indicators	30. 100%
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3			
9		Ferreren is a late (/l. t	
า		For peer review only - http://bmiopen.b	ni.com/site/about/duidelines xhfn

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2 3		31. all 23 indicator drugs and all 34 equipment
4		indicators 31. 100%
5		For public facilities, average number of For public facilities, average number of
6		32. infrastructure indicators 32. 1
7		33. drug indicators 33. 16/21
8		34. equipment indicators 34. 21/34
9		Percent of district hospital with Percent of district hospital with
10		35. access to x-ray facilities 35. 0
11		36. emergency blood transfusion 36. 0
1 <mark>2</mark> 13	De Wulf (2017)	1. The inability to pay for transportation or medications, laboratory investigations, and radiography
13		2. Health system issues 2. Limited bed capacity
15	De Wulf (2015)	Percent of hospitals with Percent of hospitals with
16		1. emergency care area beds 1. 67%
17		2. Supervisory level physicians consistently available during the entire 24 hours 2. 67%
18		3. with potable water 3. 0%
19 20		4. a list of emergency equipment 4. 67%
20		5 emergency equipment was available
21		intermittently 5. 100%
22		6. no formal training of staff for the use of this 6. 100%
23		7. surgical services and dental care 7. 67%
24		8. critical care or ophthalmological services 8. 0%
25		9 a protocol for the transfer of patients
26		requiring a higher level of care 9. 33%
27		Percent of clinics with Percent of clinics with
28		10. electricity 10. 20%
29		11. a list of emergency equipment 11. 0%
30 31		12. basic equipment to manage obstetrical 12. 0%
32		13. pulse oximetry and glucometers 13. 20%
33		14. stethoscopes 14. 60%
34		15. HIV care 15. 0%
35		16. cholera and tuberculosis care 16. 60%
36		17 a protocol for the transfer of patients
37		requiring a higher level of care
38		Percent of health facilities with Percent of health facilities with
39		18. respiratory isolation area 18. 0%
40		19. maintenance of records for patients seen in 19. 100%
41		20. existence of an additional staffing resource
42		list to be used in event of disaster or emergency 20. 13%
43		situations
44		21. access to an ambulance for interfacility 21. 13%
45		22. Use of a protocol or phones for the transfer of $22 0\%$
46		patient 23. Hospitals had increased access to equipment, materials, and
47 48		23. Resource issues medications compared to community clinics. No computed tomography existed in the region.
49 50		24. Geographic barriers 24. Some of the health centers required multiple modes of transportation, not being passable consistently by 4-wheeled vehicles.
51 52		25. Referral issues 25. Patients were referred to the closest hospital, regardless of whether that facility had the capability to handle the case.
52 53	El Tayeb (2015)	1. Demographics likely to use formal services 1. Males were almost twice as likely as females
54		2. Financial barriers 2. Affordability of the formal health service
55		2. Anordability of the formal health service 3. Geographic barriers 3. Distance
56		o. Coographic barriero d. Distance
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condition as severe and sought health care in the formal system1.57.4%2.Percent of individuals who perceived their condition as non-severe and sought health care in the formal system2.36.2%3.Demographics associated with increased seeking of formal health care3.Geographic location less than 30 minuter household head having a secondary school ed under 15, and having health insurance4.4.Percent of individuals who received medicines free of charge5.Financial barriers5.Financial barriers5.Financial barriersashtarkhani 10200)1.Calculated accessibility by 2SFCA method odkinson (2020)1.Calculated accessibility by 2SFCA method odkinson (2020)1.Barriers to seeking care2.3.Percent of people reporting wait times at facilities as a barrier to seeking care3.5.1%3.Percent of people reporting financial barriers3.5.1%4.Percent of hospitals1.7.7% in Tanzania5.With capacity to provide 24-hour emergency care3.14% in health centres and 18% in hospita6.with capacity to provide 24-hour emergency care7.7% to 35% of facilities.7.with basic infrastructure7.7% to 35% of facilities.8.With basic infrastructure7.7% to 35% of facilities.9.Percent of individ3.KHR45 000 (\$11.3)3.transport by tuk-tuk3.KHR45 000 (\$11.3)4.Vita basic infrastructure5.General	
3. Geographic barriers 3. Few citizens reside where services exist 4. Pre-hospital issues 3. Single emergency response number is in sinancial barriers 5. Financial barriers 3. Demographic bases who perceived their condition as severe and sought health care in the formal system 5. Formal system 3. Demographics associated with increased seeking of formal health care 1. 57.4% 3. Demographics associated with increased seeking of formal health care 2. 36.2% 4. Percent of individuals who perceived their condition as non-severe and sought health care in the formal system 2. 36.2% 3. Demographic barriers 3. Geographic location less than 30 minuter household head having a secondary school ed under 15, and having health neurance 4. Percent of individuals who received medicines free of charge 5. Financial barriers 5. Financial barriers 6. Financial barriers 2020) 1. Calculated accessibility by 2SFCA method 1. Ocncerns over personal safety 2. 23.1% 3. Percent of people reporting financial barriers 3. 5.1% 4. Pre-hospital issues 2. 36.2% 9. Percent of people reporting financial barriers 3. 5.1% 1. on tequipped with basic building resources 1. 78% in Tanzania 1. not equipped with basic building resources 1. 78% in Tanzania <t< td=""><td>ders, dispatchers, or</td></t<>	ders, dispatchers, or
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system was too far	
9 Training issues 9 Four health district staff reasined training	
	ng in emergency medicine
 Percent of health centre staff members who were insufficiently qualified to successfully deal 59% with the condition 	
Khan (2003) 1. Neither the ambulance driver nor the number of certification in advanced life support.	urse has any formal train
2. Equipment issues 2. Ambulances lack advanced cardiac life s	support equipment

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	3. Health system issues	There is no physical location for advanced pediatric care or pediatric resuscitation.
	4. Pre-hospital issues	4. An organized emergency medical response system does not ex no emergency number
Khan (2010)	 Mean time from occurrence of injury to arrival in the ER 	1. 4.7 h
	 Range of time from occurrence of injury to arrival in the ER 	2. Range 0.8–48 h
	3. Patients who arrived in the ER after 1 hour of	3. 675 (69%)
	injury 4. Patients who reached the ER within 1 hour of	
Kirsch (1995)	injury Percent of physicians who	Percent of physicians who
	1. had taken an Advanced Trauma Life Support course	1. 30%
	2. had taken an Advanced Cardiac Life Support course or Advanced Pediatric Life Support training	2. 0%
	Percent of physicians how believed they could adequately perform	Percent of physicians who believed they could perform
	3. intubation	3. 18%
	4. tube thoracostomy	4. 15%
	5. venous cutdown	5. 15%
	6. tracheostomy	6. 5%
	7. Staffing issues	 Nursing shortages reported in emergency departments. Trained staff were not available during many nights or weekends. IV line supplies, backboards, or cervical collars are not carried in ambulance
	8. Resource issues	 supplies, backboards, or cervical collars are not carried in ambulance 8. Specialized blood tests are not easily obtained. Limited supplies banked blood. Limited availability of CT, ultrasound, and MRI.
	9. Health system issues	 Lengthy delays in response from consulting specialities. Legal restrictions prevent ambulance drivers from starting IV lines or giving medication.
	10. Communication issues.	10. The EDs do not have radios.
Kumar (2009)	1. Pre-hospital system issues	1. Trained personnel as first responders were unavailable and pre- hospital care was lacking
Levine (2007)	 Percent of patients that have access to motorized transport Percent of providers that 	1. 20%
	 reported that their patients had to travel more than 10 km for surgical or obstetric services 	2. 62.5%
	3. had access to blood smears for malaria	3. Less than half
	 lacked access to any laboratory diagnostic equipment 	4. 44%
	5. could offer blood transfusions	4. 44% 5. 0%
	6. felt comfortable diagnosing the 7 emergency conditions assessed	6. 63%
	 felt comfortable diagnosing femur fracture or pneumonia 	7. 56%
	8. felt comfortable diagnosing obstructed labor	8. 75%
	9. felt comfortable treating the 7 emergency conditions assessed	9. 19%
	10. felt comfortable treating obstructed labor	10. 0%
	11. felt comfortable treating gastroenteritis	11. 64%
Luo (2020)	1. Standardized E-2SFCA access scores	1. 75% of shequs having a value lower than 0.4 for single trip and 0.8 for the total trip.
	 Percent of shequs can be reached by an ambulance from the nearest EMS stations within 10 min 	2. Over 50% and again a patient can be transported from his/ her shequ to the nearest hospital within 9 min.
Macharia (2009)	 Health facilities demanded cash deposits or letters of guarantee of payment before providing treatment to road traffic injury patients 	1. 14.6%
	acament to road tranic injury patients	

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45 46 47 38 48 49 50	Mock
51 52 53 54 39 56 57 58 59 60	Mock

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	3. Percent of health facilities that rated themselves as being well prepared to handle road traffic crash emergencies	3. 40.8%
	Percent of respondents that	Percent of respondents that
	4. owed the hospitals more than of US \$ 133.	4. 22.3%
	5. were in a position to pay the bills	5. 19.7%
	would approach relatives and friends for financial assistance	6. 58.7%
	were transported to hospital by unknown persons	7. 19.7%
	8. were transported to hospital by persons who were previously known to them	8. 76.5%
	9. received any form of first aid at the crash site	9. 16.0%
	10. received first aid from members of the public, other motorists or the less injured casualties	 7. 19.7% 8. 76.5% 9. 16.0% 10. 74.0% Percent of cases in which the ambulance response time was 1. 60% 2. 30% 3. 10% Percent of cases in which the time from the site to the hospital was
mood (2010)	Percent of cases in which the ambulance response time was	Percent of cases in which the ambulance response time was
	1. less than 10 minutes	1. 60%
	2. 15-20 minutes	2. 30%
	3. 30-45 minutes	3. 10%
	Percent of cases in which the time from the site to the hospital was	
	4. 5 minutes	4. 32%
	5. 10-15 minutes	5. 48%
	6. 20-30 minutes	6. 20%
new (2017)	Percent of districts that	Percent of districts that
	1. had more than 80% of the population residing within half-an-hour travel distance of a PCI-capable hospital	5. 48% 50 6. 20% 50 Percent of districts that 50 1. 36% 50
	2. had more than 90% population having timely (within 1h) access to some mode of reperfusion therapy for STEMI, either thrombolysis and/or primary PCI	 2. 57% Percent of the population 3. 69.84% 4. 21.87%
	Percent of the population	Percent of the population
	3. residing within half-an-hour travel distance from a PCI-capable hospital	3. 69.84%
	 had access to a thrombolysis-capable hospital within 1h travel time 	4. 21.87%
	5. would have had to travel more than an hour to access a reperfusion-capable hospital	5. 8.28%
k (1997)	Percent of respondents reporting	Percent of respondents reporting
	1. distance to treatment is too far	1. 8%
		2. 37%
	 preferences for other treatments Types of injuries more likely to receive formal medical care 	 3. Head or torso injuries, transportation related injuries and assaults g
	4. Use of formal medical services for persons aged less than 20 years	4. 54%
	5. Use of formal medical services for persons aged more than 20 years	 5. 61% Percent of survey respondents reporting barriers to care: 1. 20%
k (2001)	Percent of survey respondents reporting barriers to care:	Percent of survey respondents reporting barriers to care:
	1. preference for other treatments	1. 20%
	2. financial	2. 53%
	 health care utilization when health care was available in the user's town 	3. 59%
	 health care utilization when health care was not available in the user's town 	4. 41%
k (2006)	1. Training issues	1. Lack of training for trauma care, including in-service training for doctors, lack of training to use equipment

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mited. Difficulties in the tests, imaging, oxygen, entilators, prostheses fo ement programs.	BMJ Open: first published
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1			
2			
3 4		2. Staffing issues	 Lack of surgical coverage. Resources for acute resuscitation were limited. Difficulties in the
5 6		3. Resources issues	procurement process exist. Lack of laboratory tests, imaging, oxygen, fluids, chest tube equipment, pulse oximetry, ventilators, prostheses for amputees, medications.
7		4. Health system issues	 Lack of trauma registry or quality improvement programs.
840 9	Mohan (2018)	1. Demographics associated with significant pre-hospital delay	1. Elderly, rural, and illiterate populations
10		2. Barriers to seeking care	2. Recognizing symptoms as cardiac in origin
11		3. Percent of hospitals with ECG availability	3. 96.4%
12		4. Percent of outpatient facilities with ECG	4. 83%
13		availability Percent of patients	Percent of patients
14		5. to whom a hospital was the nearest medical	
15		aid	5. 54.8%
16		6. to whom a clinic was the nearest medical aid	6. 45.2%
17		 presented with more than 6 hours of prehospital delay 	7. 42%
148	Mould-Millman	Development of:	Development of:
19	(2015)	1. Tiers of Providers	1. Minimally developed
20	Assessment of Emergency	2. Recruitment and Retention of providers	2. Mostly developed
21	Medical Services	3. Continuing Education	3. Minimally developed
22	in the Ashanti	4. Initial Education	4. Partially developed
23	Region of Ghana.	5. Team Training	5. Partially developed
24		6. Equipment and Medication	6. Mostly developed
25		7. Toll-free Number	7. Moderately developed
26 27		8. Call processing and dispatch	8. Partially developed
27 28		9. Primary Transportation and Inter-facility	9. Mostly developed
29		10. Communication	10. Partially developed
30		11. Community Integration	11. Minimally developed
31		12. Healthcare System Integration	12. Partially developed
32		13. EMS Legislature, Rules and Regulation	13. Mostly developed
33		14. Sustainable Resources	14. Mostly developed
34		15. Public Knowledge	15. Minimally developed
35		16. Quality Assurance and	16. Minimally developed
36	Mould-Millman	Percent of survey respondents that:	Percent of survey respondents that believed that:
37	(2015) Accessing Emergency	1. believe EMTs offer high-quality care	1. 54.7%
38	Medical Services	2. believe it is "better" to go by ambulance	2. 86.1%
39	in Accra, Ghana:	3. believe taxis are faster than ambulances in	3. 78.0%
40	Development of a Survey	Accra 4. believe government ambulances were free or	4 52.00/
41	Instrument and	affordable	4. 53.2%
42	Initial Application in Ghana.	5. believe private ambulances were too expensive	5. 50.2%
43	in Onana.	6. knew the existence of a public access	
44		medical emergency telephone number	6. 43.8%
45		7. knew that the emergency number was a toll-	7. 37.1%
46 47		free call	
47 48		8. would be more likely to call the emergency number if they knew the call was	8. 35.7%
49		toll free	9. 45.5%
50		9. knew about the government ambulance	10. 35.3%
51		service 10. indicated it would take a government	
52		ambulance 15 minutes or less to arrive at the	11. 6.8%
53		location	
54		11. indicated it would take 60 minutes or more	
54 <u>5</u>		Dercent of exetems that utilized:	Percent of systems that utilized:
56		Percent of systems that utilized:	Percent of systems that utilized:
57			
50			

2 3			
4		1. tier-one (layperson responders trained in first aid)	1. 48%
5		2. tier-two (professional or medically-trained)	2. 96.0%
6		3. Basic emergency medical technicians	3. 84%
7		(EMTs)	
8		 advanced providers more often basic providers more often 	4. 60% 5. 84%
9		6. prehospital nurses	6. 28%
10		 prenospital nurses used only advanced providers 	
11		8. EMS physicians	8. 40%
12		9. quality assurance programs	9. 44%
13		10. research	10. 12%
14		11. Basic Life Support - capable vehicles	11. 84%
15		12. Advanced Life Support -capable vehicles	12. 68%
16		13. vehicles posted at ambulance stations	13. 72%
17	Mould-Millman (2017)	14. vehicles posted at health care facilities	14. 56%
18	(2017)	15. motorcycle ambulances	15. 12%
19		16. fixed wing air transport	16. 32%
20		17. rotary wing (helicopter) ambulances	17. 32%
21		18. water-craft	18. 12%
22		19. Total number of EMS systems identified	19. 25
23		Percent of countries in which	-
24		20. EMS systems existed in Africa	20. 29.6%
25		21. EMS systems existed in West Africa	21. 12.5%
26		22. no EMS systems existed	22. 9.3%
27		23. the questionnaire was not returned	23. 51.8%
28 29		24. some form of regulations governing EMS or ambulance operations existed	7. 4% 8. 40% 9. 44% 10. 12% 11. 84% 12. 68% 13. 72% 14. 56% 15. 12% 16. 32% 17. 32% 18. 12% 19. 25 20. 29.6% 21. 12.5% 22. 9.3% 23. 51.8% 24. 100% 25. 26%
30 31		25. an established toll-free emergency telephone number existed	25. 26%
32	Nagata (2011)	Median direct distances between injury sites and the trauma centers were	Median direct distances between injury sites and the trauma centers
33			
34		1. Viet Duc Hospital	1. 5.65 (3.19 - 8.64) km 2. 5.31 (2.89 - 8.54) km 3. 5.11 (3.11 - 8.72) km 1. 80% 2. 55.6%
35		 Bach Mai Hospital Saint Paul Hospital 	2. 5.31 (2.89 - 8.54) km
36 3 7	Natuzzi (2011)	 Same Faul Hospital Percent facilities with running water 	3. 5.11 (3.11 - 8.72) km
		2. Percent facilities with electricity without	
38		outages	2. 55.6%
39 40		 Percent of facilities with consistent oxygen source 	3. 88.9%
49	Nielsen (2012)	1. Access to emergency care services within 1	1. 100 percent in Urban Brazil, Colombia, and Maharashtra State to
42		hour	
43		2. To whom advanced life support capabilities	2. A significant number of persons in two of the upper middle income
44		during transport was available	sites
45 46		 To whom basic life support capabilities during transport was available 	 very low in Kenya, Pakistan, Sri Lanka, and Vietnam A significant number of persons in two of the upper middle income sites More than half of people only in South Africa and Gujarat State, India. Varying levels of training of providers, including no emergency medicine training Lack of medicines 45%
40		4. Training issues	4. Varying levels of training of providers, including no emergency
48	Ntabaye (1998)		medicine training
49	Nabaye (1990)		1. Lack of medicines
50		2. Percent of respondents who did not have the ability to pay for health services	2. 45%
51			3. Fare for transportation
		3. Financial barriers	
52 53		 Financial barriers Demographics more likely to seek care 	4. Those who had a higher number of missing teeth, were educated and aged more than 40 years
52 53 54			and aged more than 40 years
52 53 54 55		4. Demographics more likely to seek care	o o i
52 53 54 55 56		 Demographics more likely to seek care Percent of respondents who indicated fear 	and aged more than 40 years
52 53 54 55 56 57		 Demographics more likely to seek care Percent of respondents who indicated fear 	and aged more than 40 years
52 53 54 55 56 57 58		 Demographics more likely to seek care Percent of respondents who indicated fear 	and aged more than 40 years
52 53 54 55 56 57		 Demographics more likely to seek care Percent of respondents who indicated fear 	and aged more than 40 years 5. 6.5%

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2 348	Quima (2018)		
4	Ouma (2018)	 Percent of people living within 2-hour travel time of the nearest public hospital 	1. 71%
5 6 7		2. Percent of women of child bearing age living within 2-hour travel time of the nearest public hospital	2. 71.8%
8		 Percent of people living more than 2-hour travel time of the nearest public hospital 	3. 29%
9 10		4. Percent of women of child bearing age living more than 2-hour travel time of the nearest public	4. 28·2% 모
11 12		hospital 5. Percent of the population within 2-hour travel	 28·2% Less than 25% in South Sudan to more than 90% in Nigeria, Kenya, Cape Verde, Swaziland, South Africa, Burundi, Comoros, São Tomé and Príncipe, and Zanzibar
13 14		time of a public hospital 6. Countries with less than 50% of the	Kenya, Cape Verde, Swaziland, South Africa, Burundi, Comoros, São Tomé and Príncipe, and Zanzibar.
15		population within 2-hour travel time of a public emergency care hospital	6. South Sudan, Mauritania, Eritrea, Niger, Sudan, Madagascar, and Chad.
16 17 18		7. Countries with more than 90% of their respective population living within 2-hour travel time of a hospital	 Kenya, Cape Verde, Swaziland, South Africa, Burundi, Comoros, São Tomé and Príncipe, and Zanzibar. South Sudan, Mauritania, Eritrea, Niger, Sudan, Madagascar, and Chad. Nigeria, Kenya, and South Africa 16 5.4% report none 4.1 report none 17.6% report none or limited 39.3% report none or limited 11.6% 13.9% report no system 13.9% report no system 13.9% report no system 15.4% report no system 16.7
19 20		 Number of countries with more than 80% of the population within 2-hour travel time of a hospital 	8. 16
<u>2</u> 49	Phillips (2020)	1. Percent with EC training	1. 5.4% report none
22		2. Purpose built EU with resus	2. 4.1 report none
23		3. EU overcrowding	3. 17.6% report none
24 25		Ŭ N	4 19.4% report none or limited
26		4. EU specific equipment	4. 18.4% report none or limited
27		5. Presence and use of triage	5. 39.3% report none or limited
28		6. Use of EU guidleine	6. 11.6% ត
29 30		7. Presence of System for access to EC and first aid from trained first responders	7. 13.9% report no system
31		8. Presence of system to provide EC during	
32		transport between scene and facility, or between facilities	8. 13.9% report no system
33		9. System to access EC from trained first	
34 35		responders and the scene and urgent transport to a health facility (overall system of pre-hospital care)	9. 19.0% report no system
36	Pigoga (2020)		1. Training related to critical trauma and airway interventions, and
37		1. Training issues	neonatal care; issues with treating malnutrition or severe anaemia; inability to perform the following procedures: intraosseous access or
38 39			venous cutdown, apply three-way dressings for sucking chest wounds or perform fasciotomies or escharotomies
40		2. Health system issues	2. Only one facility with a dedicated resuscitation area
41			, , , , , , , , , , , , , , , , , , ,
42 43			3. Lack of medications, equipment, and tests, including: pulse oximetry, airway management, needle thoracostomy, chest tube, pelvice binders, ECG, ultrasound, thrombolytics, blood transfusion, defibrillation, cardioversion, pericardiocentesis, external cardiac pacing procedural sedation, IV antibiotics, IV vasopressors, uterotonic drugs
44		3. Resource issues	binders, ECG, ultrasound, thrombolytics, blood transfusion,
45			procedural sedation, IV antibiotics, IV vasopressors, uterotonic drugs
46			
47		4. Quality issues	4. Lack of: clinical protocols, protocols for communicating critical labor results for infection control infection, triage
48 49	Radjou (2013)	1. Mean distance and time travelled by direct group	 4. Lack of: clinical protocols, protocols for communicating critical labor results for infection control infection, triage 1. 31.4 km, 90 min
50 51		 Mean distance and time travelled by referred group 	2. 52.81 km, 279 min
52		 Percent of referred cases that clocked unnecessary distance to reach care 	3. 54%
53 54		 Percent of direct cases that clocked 	
54 55		unnecessary distance to reach care	4. 14.2%
56			
57			
58			
50			

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1					N N
2					Ope
3 4		 Median unnecessary distance clocked by referred cases to reach care 	5.	24.49 km	BMJ Open: first published as 10.1136/bmjopen-2022-067884 on 17 Protected by copyright, including for
5 6		Median unnecessary distance clocked by direct cases to reach care	6.	10.86 km	st pub
752 0	Razzak (2001)	1. Training issues	1. care	No ambulance driver had formal training in first aid or prehospital	lish
8 9		 Percent of ambulance services that carry only a stretcher 	2.	71%	ed a
10 11		 Cost of transport for non-air-conditioned ambulances 	3.	Pakistani rupee (PR) 7–10 (\$0.12–0.17) per mile	s 10. Pro
12		4. Cost of transport for air-conditioned	4.	PR 15–20 (\$0.26–0.35) per mile	.113 otec
13		ambulances 5. Percent of ambulance services that operate	5.	8%	6/br
14		only during day hours Percent of patients that said		ent of patients that said	njo by c
15 16		6. the streets in their area were too narrow for		3%	pen
10		an ambulance	6.		ı-20 yrig
18		 they did not use ambulances due to high cost they preferred using taxis or cars due to easy 	7.	8%	22-(ht,
19		access	8.	38%	067 inc
20 21		9. the patient was not sick enough to call an ambulance	9.	26%	884 Iudir
22		10. they used a taxi because the patient was too sick to wait for anything else	10.	20%	10.1136/bmjopen-2022-067884 on 17 April 2023. Downloa Enseignement Sup Protected by copyright, including for uses related to text
23 24		11. patient was sick enough to come to the ED	11.	45%	
24 25		12. they did not come to the ED because of the slow response of the ambulance service	12.	23%	nse es r
26		 they did not come to the ED because they 			April 2023. Dow Enseignement uses related to
27 28		did not know how to find one	13.	11%	ed to
29		14. they would call an ambulance only if they are unable to walk	14.	44%	o tex
30 31		15. they would call an ambulance only if they were very sick or near death	15.	22%	Downloaded from ment Superieur (d to text and da
32		16. they were not sure when to call an	16.	21%	id from ieur (A d data
33		ambulance 17. they knew of at least one ambulance service	17.	57%	ta ́ ∕> ≍
34		18. they knew of two ambulance services	18.	21%	h <mark>ttp://</mark> BES) . mining
35		19. they did not know of any ambulance service	19.		ing
36 37		20. knew the phone number of any ambulance	20.	0%	• O
38	Ro (2017)	service	Dore	ant of rependents that reported the primary response for not	jop I tra
39		Percent of respondents that reported the primary reasons for not seeking health care were:	seek	 14% 0% ent of respondents that reported the primary reasons for not ing health care were: 37.2% 22.2% 8.7% 5.7% 4.6% People whose mean income was below moderate levels, those lived far from a teaching hospital or close to a district hospital Paraná, Goiás, Minas Gerais, Bahia, Piauí, Rio Grande do Norte rá e Pernambuco 	mjopen.bmj.com/ on June 11, 2025 at Agence Bibliographique de l Al training, and similar technologies.
40 41		1. financial	1.	37.2%	j, nj.o
41		 use of complementary medicine the that condition was not severe enough to 	2.	22.2%	nd 🦉
43		visit hospital	3.	8.7%	v o sim
44		4. limited accessibility to hospital	4.	5.7%	n ا
45		5. social and family disapproval	5.	4.6%	r te
46		6. Those who were more likely to experience	6.	People whose mean income was below moderate levels, those	≎11
47 54 48	Rocha	unmet needs in the previous year	who	lived far from a teaching hospital or close to a district hospital	, 2(10(
	(2017)Addressing	1. States with high levels of accessibility	1. Cea	Paraná, Goiás, Minas Gerais, Bahia, Piauí, Rio Grande do Norte rá e Pernambuco	025 ogie
49	geographic	2. Number of municipalities that had high	000		es. at
50	access barriers to emergency care	accessibility to small hospitals and low to high	2.	1595	Ag
51 52	services: a	complexity center 3. Percentage of municipalities with below			enc
52 53	National ecologic study of hospitals	average access to high complexity center that	3.	74%	ё П
53	in Brazil.	were covered by small hospitals			libl
55		4. Number of municipalities that did not meet the criteria of maximum travel time of 2 hours	4.	824	iog
56					rap
57					hic
58					lue
59					de
60		For peer review only - http://bmjopen.bm	nj.con	n/site/about/guidelines.xhtml	-

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5	Rocha (2017)	1. Percentage of small hospitals that were in		
	Access to emergency care services: a	municipalities that had also high complexity centers 2. Percentage of municipalities were located	1.	26% of small hospitals
	transversal ecological study	within less than 60 km from the closest city with a high complexity center with an adult ICU	2.	63%
	about Brazilian emergency health care	3. Number of people that were at least 120 km away from a high complexity center with an adult ICU	3.	14 million
) I	network.	 Percent of the population who were more than 120 km away from a health facility with a neonatal ICU 	4.	12% Prot
8	Roy (2010)	1. Training issues	1.	Lack of training of ambulance attendants
		2. Equipment issues	2.	No resuscitation equipment in the ambulance
1 5		Odds ratio of likelihood the following groups would receive prehospital care:	Odd care	12% Lack of training of ambulance attendants No resuscitation equipment in the ambulance Is ratio of likelihood the following groups would receive prehospital 2.3 10.83 0.54 0.1 Lack of laboratory testing
5		3. road traffic accident victims	3.	2.3 Y
7		4. arriving by government ambulance	4.	10.83 G
3		5. arriving by taxi	5.	0.54
))		6. being transferred from other medical facilities for "medico-legal reasons"	6.	0.1 O.1
7	Scolari (2018)	1. Resource issues	1.	
<u>2</u> 3		2. Acceptability issues	2.	Conduct of health professional does not meet the expectations of of
5 1		3. Health systems issues	the j 3.	patients Contraction and bed limitations
5		4. Geographic barriers	4.	Geographic relationship to care
5 5 7	Sheikhbardsiri (2020)	1. Mean of patient's rights observed	1.	130.3 (SD: 40.1)
9)	Siddiqui (2008)	1. Mean distance from the residence to the hospital	1.	Hours of operation and bed limitationsSees relatedGeographic relationship to care130.3 (SD: 40.1)56.75km±123km.56.75km±123km.63 %86.5%60.6%12.7%28%32%
)		Percent of patients who		xt.
 <u>2</u>		 came late who were referred presented within 60 minutes of onset of symptoms 	2. 3.	63 % and a second secon
3 1		 were first taken to another hospital mainly cardiac hospital and then referred here 	4.	60.6%
5		 first opted for alternative medicines thought stroke symptoms would resolve 	5. c	12.7%
7		spontaneously	6.	28% ≥
3		7. did not know a single symptom of stroke	7.	32% Ta
Ð		 knew at least one stroke symptom hemiplegia was the most familiar stroke 	8.	10.9%
)		symptom	9.	67% Ģ
1 2		10. speech disturbance was the most familiar stroke symptom	10.	61% and s
3 1	Cadamaan	11. Median time from onset of symptoms and contact with general practitioner	11.	30 minutes
4 5 5	Sodemann (2006)	 Odds ratio associated with mortality risk within 30 days of first consultation for those acquainted with a medical doctor 	1.	10.9% 10.9% 67% 61% 30 minutes 10.55 Mothers belonging to Muslim ethnic groups 5%
7		Those whom were less likely to present a severely ill child	2.	Mothers belonging to Muslim ethnic groups
3	Sohayla (2020)	1. Accessed EC in last 12 months	1.	5% 9
9		2. Aware of EC services	2.	Very good: 67.7%
2 2	Stein (2016)	1. Pre-hospital issues		Lack of a single toll-free emergency number, knowledge of the ergency number, available community first responders, 24-hour EMS lability,
		2. Acceptability issues	2.	Acceptability of EMS to the community
3 3 7 5	Sultan (2019)	1. Factors associated with increased likelihood of ambulance use	1.	Amharic speaking, previous ambulance use
5 5 7				

1 2 3 4 5	
6 764 8	Suriyawongpaisal (2018)
9 የð	Suriyawongpaisal (2016)
11 199 13	Tansley (2015)
14 15 867 17 18 19 20	Tansley (2016)
21 22 23 24 25 26	
27 28 29 30 31 32 33 34	
36 36 37 38 39 40 41 42	Thomson (2005)
43 44	T
ቆ 9 46 <i>ፈ</i> ፇ 40	Treleaven (2017) Vanderschuren (2015)
48 49 50 51	Wen (2011)
52 53 54	
55 56 57	
57 58 59 60	

				7
2. use a	Odds ratio associated with the ambulance and police as a patient companion	2.	1.53	
3.	Pre-hospital issues	3. ambi	Long arrival time for ambulance, not enough distribution of ulance stations, and difficulty of accessing the phone	
1.	Financial barriers	1.	Preauthorization	
2. barri	Demographics associated with financial ers	2.	Females were less likely to have preauthorization	
1.	Financial barriers	1.	Copayment	Prot
1. trave	Percent of the population within 50km of road I distance to tertiary care	1.	28%	ected
2. 50-k	Proportion of a region's population within a m service area of a Level C facility	2. Haiti depa	Copayment 28% 0% in the more remote regions to 95.4% in the most Urban regio , 0% in the Nord Ouest department to 89.1% in the Ouest intment 8.7 to 59.4% 37% to 79% 26% to 61% 0.05 in the Obuasi Municipal District to 2.4 in the Sissala West ict ent of facilities in Namibia found to be capable of providing level: 12.4% 7.3% 1.2% 88%	ру сор
Amb	Proportion of Ghana's landmass that is ceable within 60-minutes of an National ulance Service station (from 2004 to 2014)	1.	8.7 to 59.4%	yright,
2004	Proportion of the population within a 60- te catchment area of a N/AS station (from to 2014)	2.	37% to 79%	incluc
3. area	Population within a 30-minute catchment of a N/AS station	3.	26% to 61%	ding
4.	Ambulances per 100,000	4. Distr	0.05 in the Obuasi Municipal District to 2.4 in the Sissala West ict	g for u
	ent of facilities in Namibia found to be capable oviding care level:	Perc	ent of facilities in Namibia found to be capable of providing level:	Enseignement Ises related to
5.	A	5.	12.4%	elat
6.	В	6.	7.3%	em
7.	С	7.	1.2%	to ent
	X (unsuitable for providing emergency care) ent of facilities in Haiti found to be capable of iding care level:		88% ent of facilities in Haiti found to be capable of providing care level	Superie text and
9.	A	9.	18.9%	
10.	В	10.	1.7%	ur (A data
11.	C	11.	0.9%	
12.	Х	12.	81.1%	ni ES
1.	Health system issue	•	Rural, district and small Urban hospitals have no emergency artment). ng, A
2.	Training issue	2.	No emergency medicine training	t t
3. ⊿	Staffing issue	3. ⊿	EDs are staffed by only one doctor	ain
4. 5.	Resource issues Financial barriers	4. 5.	Lack of CT availability after hours Patients must pay cash for any imaging	ing
5.		5.	Fallents must pay cash for any imaging	, а
6.	Pre-hospital system issues	cellu	Ambulances have to travel up to 200 miles, lack of helicopters, te ambulance services have tried to link their control rooms to lar networks, which has delayed response to major accidents and ents by the responsible authorities, lack of dispatchers	BES) . mining, Al training, and similar technologies.
1. outco	Demographics that demonstrated worse omes	1. anoti	Poorer, younger, rural, and children who were referred from her facility children	r tech
	Percent of fatalities that were outside of the en Hour	1.	53.1%	nolog
2.	Fatality rate within the service areas	2.	2.25 fatalities/km	ies
3.	Fatality rate within the service gaps	3.	2.91 Tatailles/km	
1.	Financial barriers	1.	Payment is requested at the time of care	Ű
	Percent of individuals who were prevented receiving treatment due to lack of payment	2.	one-third	
3.	Pre-hospital system issues	3.	Lack of prehospital care	
4.	Geographic barriers	4.	Hours of travel are required in remote areas	
5.	Resource issues	5.	Lack of resources, including electricity and equipment	

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2			
3 4 5 6		6. Training issues	6. No emergency medicine training, one hospital provided specialised training at the basic life support (BLS) level, and no hospital provided courses such as Advanced Cardiac Life Support (ACLS), Advanced Trauma Life Support (ATLS), or Paediatric Advanced Life Support (PALS) training.
772 8	Wesson (2015)	1. Training issues	1. No formal or trauma-specific training, very few providers are trained in BLS or ACLS.
9		2. Resource issues	2. Lack of basic trauma equipment.
10		3. Geographic barriers	3. Distance to a facility
11 12		4. Pre-hospital issues	 A publically available ambulance system did not exist, lack of community awareness of emergency phone number, lack of function of emergency phone number
13		5. Transportation issues	5. Lack of transport to the health care facility.
14 15		6. Staffing issues	 It is not safe for the medical officers to report to the hospital at night
16		7. Financial issues	7. Inability to pay hospital fees and transport
17 18		8. Respondents' opinion on how to improve pre-hospital care	 Provide first aid and triage trauma training to community members and the police
19		9. Factors affecting the decision to seek care	9. Severity of the injury, traditional medicine and religion
73 20	WHO (2015)	1. Availability of potatble water	1. Globally: 62%, AFRO: 58%, AMRO: 70%, SEARO: 78%
21		2. Avavilability of sanitation	2. Globally: 81%, AFRO: 84%, AMRO: 57%
		3. Availability of hand hygiene (soap)	3. Globally: 65%, AFRO: 64%, AMRO: 65%
22 74 23	Zaidi (2013)	1. Median travel time to ER	1. From Hyderabad: (20 minutes), from Mansehra (120 minutes).
24 25		2. Odds ratio associated with patients likely to seek immediate health care at a non-medical facility or administer self- treatment compared to visiting a medical facility	2. Peshawar: 144.45 , Bahawalpur: 131.36, Abbottabad - 5.12, Hyderabad - 6.87
26 27 28	Zimmerman (2020)	Percent of patients who waited the following times to evaluated by a physician in the ED	Percent of patients who waited the following times to evaluated by a physician in the ED
20 29		1. 0.0 to 15.0 minutes	1. 69.2%
30		2. 15.1 to 30.0	2. 19.0%
31		3. more than 45.0 minutes	3. 7.8%
32		4. 30.1 to 45.0 minutes	4. 4.1%
33		5. Percent of patients who waited the 0.0 to 1.0	
34		hours to receive lab tests	5. 48.4%
35		6. Percent of severe GCS patients who	4
36		received lab tests within 1.0 hours of physician	6. 56.1%
37		evaluation	
38		 Percent of mild GCS patients who received lab tests within 1.0 hours of physician evaluation 	7. 52.0%
39 40 <u>41</u>		 Percent of moderate GCS patients who received lab tests within 1.0 hours of physician evaluation 	8. 53.0%
41 42			
42			
44			
			-

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	NA
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5-6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5-6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5-6, Supplement
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6-7
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	7-9
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	7-8
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	NA



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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	7-9
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	10
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	10-12
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	10-19
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	10-19
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	19-20
Limitations	20	Discuss the limitations of the scoping review process.	21-22
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	22-23
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	1

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

[‡] The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.