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Defining measures of emergency care access in low-income and middle-income countries: a scoping review

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ABSTRACT

Background Over 50% of annual deaths in low-income and middle-income countries (LMICs) could be averted through access to high-quality emergency care.

Objectives We performed a scoping review of the literature that described at least one measure of emergency care access in LMICs in order to understand relevant barriers to emergency care systems.

Eligibility criteria English language studies published between 1 January 1990 and 30 December 2020, with one or more discrete measure(s) of access to emergency health services in LMICs described.

Source of evidence PubMed, Embase, Web of Science, CINAHL and the grey literature.

Charting methods 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 categorised by access type, defined by Thomas and Penchansky, with further categorisation according to the 'Three Delay' model of seeking, reaching and receiving care, and the WHO's Emergency Care Systems Framework (ECSF).

Results A total of 3103 articles were screened. 75 met full study inclusion. Articles were uniformly descriptive (n=75, 100%). 137 discrete measures of access were 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 22 (16.0%), 46 (33.6%) and 69 (50.4%), respectively. According to the ECSF 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 with facility-based care (n=57, 41.6%).

Conclusions Numerous measures of emergency care access are described in the literature, but many measures are overaddressed. Development of a core set of access measures with associated minimum standards are necessary to aid in ensuring universal access to high-quality emergency care in all settings.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ We performed an extensive search in multiple databases and the grey literature of all emergency care access measures according to known the best principles of scoping reviews.
⇒ Categorisation of measures was performed according to three separate frameworks of access and emergency care.
⇒ This study is limited to the available English-language literature.
⇒ Given limitations in the data, we cannot comment on the feasibility of implementing the categorised access measures, provide consensus on which measures correspond to more likely improvements in patient outcomes, nor provide minimum standards for measures.

INTRODUCTION

The past 20 years have been called a golden age of public health.[1] A dramatic increase in global health funding has expanded healthcare resources in low-income 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 have been far less substantial.[6] While a shift from disease-specific programmes 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 access in LMICs has been completed to date. The aim of this scoping review is to categorise all known measures of emergency care access in LMICs in order to help standardise and prioritise emergency care development.

MATERIALS AND METHODS

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 grey literature search was conducted via both Google and Google Scholar, with searches targeted towards organisations that work on global emergency care.

The initial search strategy (online supplemental appedix 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 standardised MeSH headings/subheadings were used to optimise sensitivity for relevant literature while minimising 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.

The grey literature search was completed via Google and Google Scholar. We performed targeted searches using similar terms relevant to access, including affordability and barriers to care. The search was targeted towards government ministries of health, professional organisations specific to emergency care and among well-established non-governmental organisations, including development agencies and those specific to healthcare policy. There were no initial regional or income-level specifications given to this search.

Studies published between 1 January 1990 and 30 December 2020, English-language, and describing at least one discrete measure of access to emergency care services in at least one LMIC were included. LMICs were defined by World Bank economic definitions as the gross national income per capita of the year the research was performed. 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 excluded data specific to emergency obstetric and newborn care seeking (we anticipate a separate forthcoming review on the subject).

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

Manuscripts 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 and JD). Disagreements were resolved by a third reviewer (CBB). 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 time frame, location, study type, setting, methodology, access measure(s) reported, and the primary outcome(s). Countries under study were categorised 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.

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 categorised 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

Table 1 Proposed emergency care access measures for monitoring, evaluation and comparative analysis by access type

Access type	Definition from penchansky and thomas	Adapted definition for emergency care	Proposed sample emergency care access measures
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.	No of EC beds per catchment area
			Presence of drug, technology or interventions specific to EC
			Presence of EC clinicians 24 hours a day
			Per cent of clinicians with EC training
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
Affordability	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
Accommodation	The relationship between the manner in which the supply resources are organised 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 organised (time of operation, level of training and services able to be rendered) relative to a patient's need.	Hours of operation of EU
			No of transfers per patient
			Average EU time to provider
			Training provided per specific EU interventions
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 sociocultural 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

EC, Emergency Care; EU, Emergency Unit.

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 healthcare system. For example, a healthcare facility may be available (ie, it exists), but not accessible because of transportation barriers. In addition, the healthcare facility may not have necessary measures to accommodate a patient (such as 24-hour-access or childcare), may be unaffordable, or may be unacceptable (ie, due to poor quality or corruption). While dated, and originally validated in the consumer patient satisfaction world, multiple recent studies on healthcare access in low-income and middle-income studies have shown utility and validity for this framework, including among geriatric healthcare in Southeast Asia, on HIV treatment access during Covid in Ghana, and among displaced in the Lake Chad region of Cameroon, Chad, Niger and Nigeria.[27–29]

More recently, other models have emerged that may provide greater applicability to emergency care. With this in mind, we provide analyses and categorise access measures via two additional frameworks. The 'Three Delay' model was originally conceptualised to understand delays in care leading to increased maternal mortality but has been more recently applied to emergency care.[30 31] The Three Delay model defines three critical phases of timely care: seeking, reaching and receiving care. The WHO's ECSF provides another method of understanding emergency care access. The ECSF defines the human resources, equipment and functions necessary for a fully functioning emergency care system at the scene of illness, during transport to a health facility (prehospital) and within healthcare facilities.[9 16]

All 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 per cent. Each measure was then categorised according to the three frameworks listed above. Given the heterogeneity of study methods and types, a qualitative analysis

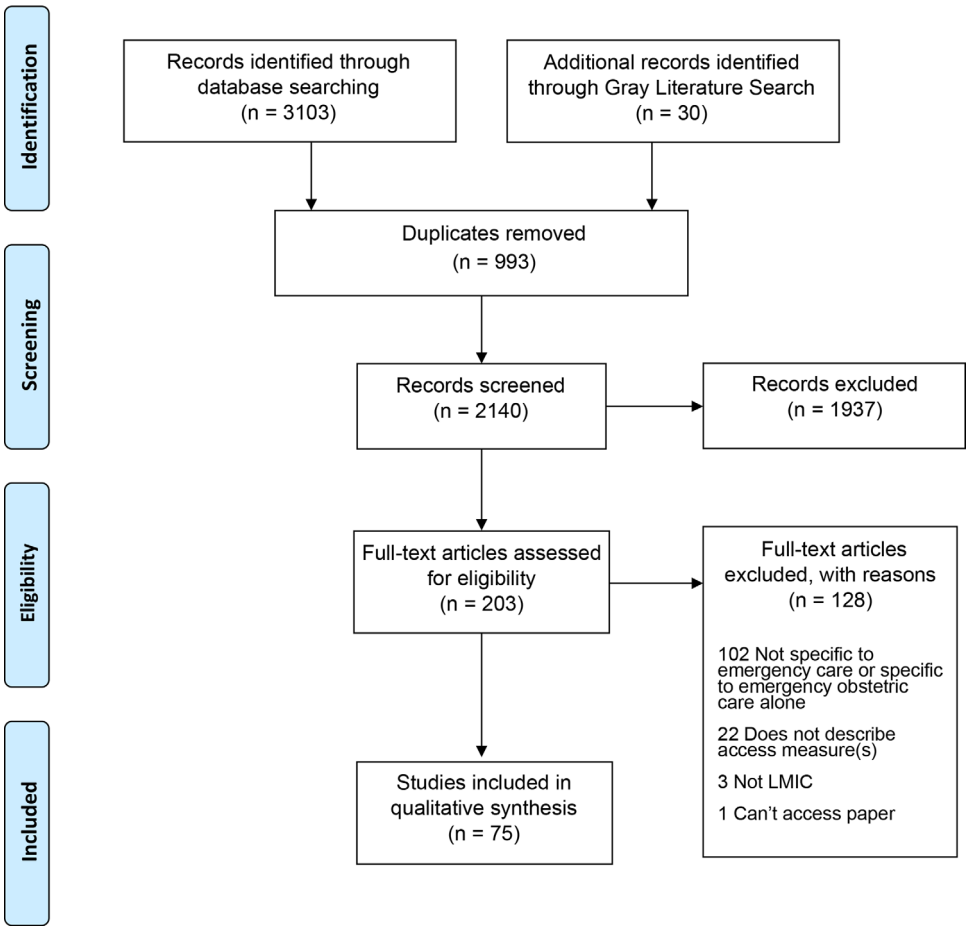

Figure 1 PRISMA flow diagram for review of literature on access to emergency care measures in LMICs. LMICs, low-income and middle-income countries; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-analyses.

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 Meta-analyses Extension for Scoping Reviews statement were adhered to in reporting.[32]

RESULTS

A total of 3103 articles were identified for screening via database searches, and 30 were included from the grey 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 (online supplemental eTable 1).

All but 1 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 1 (1.3%) article focused on paediatric 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.

Methodologically, all studies were descriptive and relied on key informant interviews (n=14, 18.7%), surveys (n=13, 17.3%) or cross-sectional data (n=43, 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 (patients, clinical providers, administrators) of participants. The majority of studies (n=48, 64.0%) 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 units or departments.

Measures by access type

In sum, 137 unique measures of access were described in the 75 studies (table 3). Of the 75 total studies, most (n=49, 72.1%) reported more than one unique measure.

Table 2 Characteristics of manuscripts for study inclusion

Characteristic	N (%)
Country	n=75
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)
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	
Quantitative	24 (32.0)
Qualitative	47 (62.7)
Mixed	4 (5.3)
Methodology	
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	
General EM care	44 (58.7)
Prehospital care	22 (29.3)
Trauma care	10 (13.3)
Paediatrics	1 (1.3)
No 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)

*At least one study from the following countries including Bangladesh, Cambodia, Cameroon, China, Eswatini, Ethiopia, Guinea-Bissau, Haiti, Honduras, Iran, Malaysia, Nigeria, Philippines, Rwanda, Samoa, Solomon Islands, Sierra Leone, Sudan, Tanzania, Thailand, Vietnam, Yugoslavia, Zambia, Zimbabwe.
†N=43.
EM, Emergency Medicine; RCT, Randomized Controlled Trial.

Based on Penchansky and Thomas' categories, the highest number of discrete measures of access described accommodation (n=42, 30.7%), followed by availability (n=40, 29.2%). In many instances, a single measure was studied reported more than once leading to a total of 306 total measurements. Among total measures, measures of availability (n=120, 35.7%) were disproportionality over-represented while measures of affordability were under-represented (n=34, 10.1%).

Availability

Unique measures of availability, defined as the relationship of the volume and type of existing services to the clients' volume and types of needs, totalled 40 (29.2%; table 3). Total measures of availability were studied most often (n=120, 35.7%). Of the unique availability measures, most (n=29, 72.5%, table 4) 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 (eg, CT and MRI) and emergency laboratory service (eg,

Table 3 Unique and total number of access measure categorised by access type

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)

*Awareness accounted for four of the unique measures.

Table 4 Unique access measures categorised by type and delays in care

	Availability N=40	Accessibility N=19	Accommodation N=42	Affordability N=17	Acceptability N=19
Seeking N=22	N=2	N=3	N=5	N=1	N=11
	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 to miss work/secondary 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)
	Presence of dispatchers (68)	Presence of a national universal toll-free emergency no (6, 9, 10, 13, 14, 28, 43, 62, 71)	Concerns over personal safety in seeking care (25)		Awareness of emergency care systems and services (5, 11, 52, 61)
		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)		Community accepts and uses EMS care (62)
			Presence of adequate child care (10)		Fear of emergency dental treatment (47)
			Required paperwork filled out before emergency care (13)		Knowledge of emergency no (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 (eg, 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 enough to seek care (8, 17, 23, 52, 53, 72)
Reaching N=46	N=9	N=13	N=12	N=8	N=4
	Basic building (ie, structural) resources specific and purpose built to emergency care (26)	Dispatcher training provided (6)	EMS delays: general (25); due to referrals (59)	Ambulance fee (27, 64)	Ambulances acceptable based on: language (63), if police involved/transport (63), slow response time (52)
	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)	Ambulance fee by ambulance-type (52)	Patient preference of ambulance care over other forms of transport (52)
	Fuel available for ambulances (14)	Calculated accessibility by 2SFCA method (24)	Equitable (plan for) distribution of ambulance stations (63)	Ambulance referral fee (27)	Prehospital care acceptable to: those taking government ambulance (56), those taking taxis (56), road traffic accident victims (56), those being transferred for medicolegal reasons (56)
	Fuel for general (non-ambulance) transport (14)	Per cent of patients who sought care or made it to a facility within 60 min of onset of symptoms (59)	Facilities are notified in advance of patients arriving (15)	Cost of transport (11, 14, 17, 19, 22, 47, 72)	Previous ambulance use and willingness to use ambulances in the future (63)

Continued

Table 4 Continued

	Availability N=40	Accessibility N=19	Accommodation N=42	Affordability N=17	Acceptability N=19
	Presence of any healthcare facility (14)	Response time from initial call to scene (3, 7, 14, 22, 35, 63, 70)	General maintenance issues with vehicles (11)	Payment required before treatment (34)	
	Presence and no of ambulances for interfacility transport (20)	Roadways limits access: traffic (1); poor or narrow roads (11, 14, 20, 52)	No of separate modes of transportation (per patient) to reach care at facility (20)	Preauthorisation fee (64)	
	Presence and no 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)	
	Presence and no of ambulances without medical capabilities/transport only (52)	Transport time from a location to a facility with specific EU capabilities (ie, PCI-capable hospital, trauma centre, obstetric emergencies, tertiary hospital; 36, 45, 48, 55)	Per cent of missed or prolonged pick-ups due to prehospital provider misunderstanding of location (6)	Private vehicle transport fees (27)	
	Presence and no 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)		
		Transport time from scene to hospital (13, 29, 33, 35, 74)	Private ambulance services control rooms linked to cellular networks (68)		
		Travel distance (5, 13, 14, 21, 20, 22, 27, 32, 51, 57, 59, 66, 71, 72)	Regulations governing EMS (43)		
		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 handle the case (20, 49)		
		Weather/climate limits access: rainy season (11)			
Receiving N=69	N=29	N=3	N=24	N=8	N=4
	Absolute no of EU providers (stratified by type: physicians, nurses and EMS providers; 6, 10, 13, 14, 17, 18, 30)	No of (trauma) fatalities within and outside the first hour (70)	Presence of disaster plan including, additional staffing for disasters (49, 68)	Absolute cost of EC treatment (5, 13, 17, 21, 23, 34, 47, 53, 71, 72)	Acceptable providers conduct and attitudes towards patients (13, 14, 57)
	Advanced cardiac life support or resuscitation equipment available in ambulances or no of ACLS ambulances (28, 30, 46, 56)	Fatality rate per patient kilometre from facility (70)	Availability of 24-hour ambulance care (no night hours, 52)	Copayment for care (65)	EC in line with patient's human rights (58)
	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 treatment (19)	Providers/per cent of providers deemed corrupt (13)
	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 medical investigations and radiography (19)	Sought care for wounds/ trauma (5)
	Availability of EU infection control materials including) soap (26, 77)		Care provided during transport (14)	Cost of medicines (17, 23)	
	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 bonesetter (8)	
	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)		Legal protections for ambulance providers distributing and providing care (28)	Hospital costs beyond scope of patient (eg, proportion of cost to individual finances) (34)	
	Availability of imaging (general: 17, X-ray: 15, CT: 30, 68, ultrasound or MRI: 30)		Miscommunication or mistriage of patient acuity (6)	Payment required in cash for imaging (34)	

Continued

Table 4 Continued

Availability N=40	Accessibility N=19	Accommodation N=42	Affordability N=17	Acceptability N=19
Availability of laboratory/diagnostic testing material (general blood/urine tests: 17, 30, 32, 57; malaria smears: 32)		No of transfers per patient (6)		
Availability of potable (sterile) water (20, 73)		No and per cent mistriage (6)		
Availability of prehospital providers with standardised training (9, 22, 28, 52, 56)		Per cent of hospitals with out-of-hours clinician coverage (18)		
Availability of sanitation (toilet, 73)		Physician comfort in adequately performing EU-specific procedures (30, 50)		
Availability of specified care: trauma care (4); orthopaedic (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); ophthalmological care (20)		Presence of overcrowding (49)		
Electricity available (20, 26, 45)		Presence of a standardised EMR (13)		
Emergency equipment list available (20)		Protocols for patient transfers (20)		
First aid received on scene by lay providers (ie, members of the public, other motorists or the less injured casualties; 34, 49)		Protocols specific to trauma care (15)		
First aid received on scene by trained providers (34)		Safe passage for health providers to the hospital at night (72)		
No of doctors staffing EU (appropriate for size; 68)		Staff comfort in treating EU conditions (32, 34)		
No of EU-specific area beds (20)		Training for community members and police: first aid and triage (72)		
No of hospital-facility (non-EU specific) rooms or beds (10, 19, 57)		Training for providers: adult triage (18)		
Presence of EU with resuscitation bed/zone (49, 50)		Training for providers: EU-specific (13, 14, 27, 46, 71)		
Presence of EU (within facility; 2, 68)		Training for providers: paediatric triage-specific (18)		
Presence of EU dedicated nursing personnel (18)		Time to lab tests (75); by patient GCS (75)		
Presence of facility burn unit (2)		Time to provider (eg, wait time; 25, 75)		
Presence of triage (13, 14, 49, 50)		Utilisation and access to standardised clinical care guidelines: general approach (15, 49); condition-specific (sepsis, DKA, anaemia, 15)		
Staff qualified to utilise EU equipment (26)				
Staff qualified to treat EU conditions (27)				
Staff with EC training: ACLS or BLS training (30, 71, 72); ATLS, PALS (30, 72)				
Staff with specialised training relevant to EC: 49, adult critical care (18); continuing education (18); EU equipment use (20); neonatal care (50)				

ACLS, Advanced Cardiovascular Life Support; ATLS, Advanced Trauma Life Support; BLS, Basic Life Support; DKA, Diabetic Ketoacidosis; EC, Emergency Care; EMR, Emergency Medical Record; EU, Emergency Unit; GCS, Glascow Coma Scale; PALS, Pediatric Life Support.

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 75 studies (12.0%).

Accessibility

Unique measures of accessibility—the location of supply and the location of clients—totalled 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 min to 2 hours. The range of distances to health facilities demonstrated similar variability, though most (n=13) measurements were in kilometres. 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 (eg, 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 organised 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 categorised as receiving care, facility-based measures (n=11, 44.0%) included measures of provider timeliness and availability, provider training, overcrowding and protocols for care. Among the unique measures of accommodation, 4 (8.9%) described the use of standardised protocols (3 related to prehospital care and 1 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 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 the 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 sixth category of access. There were five unique measures of awareness, which largely overlapped with the previous five 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 categorised as either, seeking, reaching or receiving care (table 4). Unique measures of seeking care (N=22, 16.1%) largely dealt with prefacility care and included individual thought processes, the sociocultural forces underlying care seeking behaviour 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 ECSF (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, 55.5%) 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, 89.5%). None of the included manuscripts measured EU disposition or elements of early inpatient care.

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] Analysis

Table 5 Unique number of access measures as defined by the WHO ECSF by access type

WHO ECSF		Total*	Access type				
Site	Primary function	N=133 (%)	Availability N=39 (%)	Accessibility N=18 (%)	Accommodation N=42 (%)	Affordability N=17 (%)	Acceptability N=19 (%)
Out of 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)	4 (21.1)
Facility-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)		4 (9.5)		
	EU care	51 (38.3)	26 (66.7)	1 (5.6)	13 (31.0)	8 (47.1)	3 (15.8)
	Disposition	--					
	Inpatient care	--					

*Total is out of 133, as 4 measures could not be defined by ECSF.
ECSF, Emergency Care Systems Framework; EMS, Emergency Medical Services; EU, Emergency Unit.

of emergency care access measures in detail elucidates 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.

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, on 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 contextualise 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 gross domestic product (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 ECSF sought to provide further context to health policy-makers on the role of 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 emergency unit (EU) reception process (eg, registration, screening and triage) or the transfer of care between prehospital and facility-based providers. In addition, 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-income, middle-income 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 Arabic. Second, while

a grey literature review was conducted, we are likely missing measures in use by health facilities, global health organisations and health ministries. Further attempts at key informant interviews or focus groups with those in LMICs, undoubtably would uncover other measures, but were 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 recognise 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 online supplemental 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 (eg, the Lancet Commission on Global Surgery has recommended a maximum 2-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.

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. Standardised, consensus-based measures of emergency care access in line with the ECSF should be developed to allow for more universal comparisons of healthcare functions.

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