Plan Overview

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Title: Service Effectiveness and Quality in Indonesian Prehospital Emergency Care: A Tripod Mixed-Methods Case Study of System, Provider, and User Perspectives

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Project abstract:

This study examines service effectiveness and quality in Indonesian prehospital emergency care through system, provider, and user perspectives. The service is dealing with cases including traumatic injury, cardiac conditions, obstetric emergencies, stroke, drowning, choking, and suicide attempts. In these situations, first aid, stabilisation, and rapid evacuation to hospital are essential because definitive treatment is provided in hospital. Emergency Medical Services (EMS) in low- and middle-income countries often face fragmented coordination, such as limited public awareness, inadequate infrastructure, workforce shortages, and constrained funding. These systemic challenges reducing the prehospital emergency care effectiveness and quality because the service supposed to be time-sensitive.

Indonesia is selected as the case because it represents a resource-stretched EMS setting with complex geographical, organisational, and service delivery challenges. Although Indonesian EMS is expected to provide effective and quality prehospital emergency care, it faces limited ambulance availability, inadequate equipment, shortages of certified prehospital personnel, referral delays, unclear dispatch categorisation, and complicated health financing. However, Indonesia also demonstrates local adaptation, such as boat ambulances, motorcycle ambulances, ambulance-based obstetric emergency services, and collaboration with community first responders in urban and rural setting. Therefore, Indonesian EMS provides an important case for understanding how a resource-stretched system continues to function through adaptation, coordination, and the involvement of multiple stakeholders.

This research is aimed to answer the question of How does Indonesian Emergency Medical Service in a resource-stretched setting deliver effective and quality prehospital emergency care from the perspectives of system, provider, and user? The study has three sub-questions. Phase One asks: What is currently known from the available evidence about the strengths, weaknesses, and structural challenges of the resource-stretched Indonesian EMS system? Phase Two asks: How do system, provider, and user perspectives explain EMS effectiveness

and quality? It also asks whether EMS effectiveness is associated with users' experience of quality. This study will explore two main concepts which are effectiveness and quality. Effectiveness will be interpreted through the Complex Adaptive System lens, including connectivity, co-evolution, nested systems, self-organisation, emergence, and edge of chaos. Quality will be interpreted through Person-Centred Care principles, including communication, dignity, safety, responsiveness, continuity, and patient or family experience.

The study consists of two phases. Phase One is a literature review. This phase will review existing evidence on Indonesian EMS and identify what is currently known about system performance, strengths, weaknesses, and structural challenges. The findings will be synthesised using the PAGER framework. Phase Two will use a convergent parallel mixed-methods design. The qualitative and quantitative strands will be conducted within the same phase, analysed separately, and then integrated during interpretation.

The qualitative strand will use a single-case in-depth case study. The case investigated is EMS delivery in a resource-stretched setting, represented by the PSC 119 network in Surabaya City, East Java. The qualitative population is the EMS network in Surabaya. Approximately 45 participants will be recruited using purposive sampling from three groups of system, provider, and user. Participants will include EMS managers, coordinators, dispatchers, hospital emergency department representatives, insurance bodies, disaster management organisations, ambulance nurses, physicians, drivers, community first responders, patients, and family members. Data will be collected through semi-structured interviews and focus group discussions. The qualitative data will look at the perspective of participants about the EMS in this resource-stretched setting deliver effective and quality service.

The quantitative strand will use an observational analytic design with prospective case-level data collection. The population is patient care episodes managed by PSC 119 Surabaya. The sample will include approximately 75 eligible care episodes, selected through consecutive total sampling. Effectiveness will be the independent variable and users' experience of quality will be the dependent variable. EMS effectiveness will be measured using a modified WHO PEAT instrument adapted into case-level indicators. Users' experience of quality will be measured using the Prehospital Emergency Care Patient Satisfaction Scale. Descriptive statistics and linear regression will be used to analyse the quantitative data.

Data will be collected after obtaining permission from relevant institutions in Surabaya. The researcher will join selected ambulance responses to observe prehospital care, while user experience data will be collected after the emergency episode, preferably within 72 hours. Ethical approval will be sought from the University of Birmingham and the Faculty of Nursing, Universitas Airlangga. The novelty of this study lies in its integrated explanation of Indonesian EMS as a resource-stretched complex adaptive system that delivers person-centred prehospital emergency care through the interaction of system complexity, provider adaptation, and user experience.

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Data description

What types of data will be used or created?

1. Data Description

This study will generate qualitative, quantitative, and mixed-methods data. The qualitative data will include audio recordings of interviews or focus group discussions, verbatim transcripts, field notes, observation notes, document review notes, and qualitative coding outputs. These data will be collected from system actors, EMS providers, and users of PSC 119 ambulance services in Surabaya City.

The quantitative data will include case-level observational data from prehospital emergency care episodes, EMS effectiveness checklist data, user experience questionnaire responses, and contextual variables related to patient, provider, team, and operational characteristics. The main quantitative variables are EMS effectiveness and users' experience of quality. EMS effectiveness will be measured using a modified WHO PEAT instrument adapted into case-level indicators, while users' experience of quality will be measured using the Prehospital Emergency Care Patient Satisfaction Scale.

Existing evidence will also be reused in Phase One through a literature review. This will include published journal articles, policy documents, reports, service standards, and other relevant documents on Indonesian EMS. No existing individual-level patient dataset is planned for reuse.

2. Data Format

Audio recordings from interviews or focus group discussions will be stored in standard audio formats such as .mp3 or .wav. These formats are widely used and suitable for transcription and secure storage. Online interviews, if needed, will be conducted using Microsoft Teams. Face-to-face interviews will be recorded using a password-protected digital recorder or encrypted recording device, subject to participant consent.

Interview transcripts, field notes, interview guides, consent forms, and documentation files will initially be prepared in .docx format because this is practical for editing and review. Final versions of participant-facing documents and archived documentation will be stored as .pdf or .pdf/a where possible. Quantitative data will be stored in .xlsx during data entry and checking, and exported to .csv for long-term preservation because CSV is an open, non-proprietary format. Statistical analysis files may also be stored in .sav, .rds, or similar formats depending on the software used, but a CSV version and data dictionary will be retained for accessibility.

Qualitative coding files may be stored in NVivo project format if NVivo is used. However, exported codebooks, coding summaries, and framework matrices will also be stored in .xlsx, .csv, or .pdf formats to support long-term access. Mixed-methods integration outputs, including joint displays, will be stored in .docx, .xlsx, and final .pdf formats.

3. Data Collection and Creation

Phase One will collect literature review data from academic databases, policy documents, and relevant grey literature. The review will document search strategies, inclusion and exclusion decisions, screening records, and data extraction tables.

Phase Two qualitative data will be collected through semi-structured interviews or focus group discussions with system, provider, and user participants. Interviews may be conducted face-to-face, by telephone, or through Microsoft Teams, depending on participant preference and feasibility. Audio recording will only be conducted after informed consent. If participants do not agree to recording, detailed written notes will be taken instead.

Quantitative data will be collected prospectively from patient care episodes managed by PSC 119 Surabaya. The researcher will join selected ambulance responses and observe the prehospital emergency care process without interfering with clinical care. EMS effectiveness data will be recorded using a structured case-level checklist. User experience data will be collected from the patient or a directly involved family member after the emergency episode, preferably within 72 hours, when the participant is clinically stable and emotionally able to participate.

How will the data be structured and documented?

Data will be organised by phase, data type, and participant or case identifier. A consistent file naming system will be used. For example:

2026_Phase2_Interview_System_SYS001_v01.docx
2026_Phase2_Audio_Provider_PROV003_v01.mp3
2026_Phase2_Quant_CASE015_v01.xlsx
2026_Phase2_JointDisplay_v01.xlsx

Each participant and care episode will be assigned a unique study ID. Qualitative participants may be coded as SYS001, PROV001, or USER001. Quantitative care episodes may be coded as CASE001, CASE002, and so on. Identifiable information, such as names, telephone numbers, signatures, and consent forms, will be stored separately from research data.

Documentation will include a data dictionary, variable list, scoring guide, codebook, interview guide, questionnaire blueprint, recruitment log, consent record, and version control log. For quantitative data, the data dictionary will define each variable, coding categories, missing data codes, scoring procedures, and derived variables. For qualitative data, the codebook will describe codes, definitions, example quotations, and links to the analytical framework. Mixed-methods documentation will include joint displays and notes explaining how qualitative and quantitative findings were integrated.

Data storage and archiving

How will your data be stored and backed up?

Electronic data will be stored securely using External Solid State Drive (SSD), where access is restricted to authorised project members. Sensitive files will not be stored on unencrypted USB drives or personal cloud services.

Audio recordings, transcripts, consent forms, contact details, and raw questionnaire data will be stored in separate folders with restricted access. Identifiable data will be kept separately from anonymised research data. Email attachments containing identifiable or sensitive data will be avoided where possible.

Is any of the data of (ethically or commercially) sensitive nature? If so, how do you ensure the data are protected accordingly?

This study will involve human participants and may include sensitive information about emergency health experiences, ambulance care, patient condition, service use, and professional practice. Therefore, the data will be treated as ethically sensitive and managed in accordance with the University of Birmingham Data Protection Policy, relevant UK data protection requirements, Indonesian

ethical requirements, and the conditions of ethical approval.

Informed consent will be obtained before data collection. Participants will be informed about the type of data collected, how the data will be stored, who will have access, how confidentiality will be protected, and whether anonymised data may be used in publications or archived. Participants will be informed that taking part is voluntary and that they may withdraw according to the terms stated in the participant information sheet.

All transcripts and datasets will be anonymised or pseudonymised as early as possible. Names, telephone numbers, addresses, vehicle identifiers, staff identifiers, hospital identifiers where necessary, and other direct identifiers will be removed or replaced with codes. Potentially identifiable contextual details will be generalised where needed. Direct quotations used in publications will be checked to reduce the risk of identifying participants.

Where will your data be archived in the long term?

At the end of the project, selected anonymised research data and supporting documentation will be prepared for long-term preservation. These may include anonymised quantitative datasets, data dictionaries, questionnaire documentation, coding summaries, framework matrices, and mixed-methods joint displays. Raw audio recordings, consent forms, contact details, and identifiable datasets will not be shared openly.

Data will be retained and archived according to University of Birmingham requirements and the conditions of ethical approval. Where appropriate, anonymised and non-sensitive data may be deposited in the University of Birmingham eData repository. The repository will make the dataset discoverable and allow appropriate access conditions to be applied. If needed, an embargo period may be used to allow thesis completion and publication before data are made available.

Data sharing

Which data will you share, and under which conditions? How will you make the data available to others?

Not all data from this study will be suitable for open sharing because the project involves human participants, emergency care experiences, health-related information, and potentially identifiable qualitative accounts. Raw audio recordings, full interview transcripts, consent forms, and identifiable case-level data will not be shared publicly.

The data that may be shared include anonymised quantitative datasets, aggregated findings, blank instruments, data dictionaries, scoring guides, and selected anonymised analytical outputs. Where qualitative data are shared, this will be limited to anonymised excerpts or thematic summaries that do not identify participants, organisations, or specific incidents. Data sharing will follow the consent provided by participants and the conditions approved by the ethics committees.

Where data are deposited in a repository, a data access statement will be included in publications and the thesis. Anonymised and reusable materials may be shared under an appropriate licence, such as CC BY, where this does not conflict with ethical or confidentiality requirements. Restricted access may be applied for data that cannot be made openly available but may be considered for controlled academic reuse.