International Platform of Registered Systematic Review and Meta-analysis Protocols

INPLASY

Leptospirosis in Uganda: A Scoping Review of epidemiology, risk factors and Gaps in Surveillance

INPLASY202530073
doi: 10.37766/inplasy2025.3.0073
Received: 17 March 2025
Published: 17 March 2025

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ADMINISTRATIVE INFORMATION

Support - ZJE-UoE institutional Funding.

Review Stage at time of this submission - Data extraction.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202530073

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 March 2025 and was last updated on 17 March 2025.

INTRODUCTION

Review question / Objective What evidence exists on the epidemiology, risk factors, and surveillance of leptospirosis in Uganda, and what gaps remain in research and public health response?
Population: Humans and animals in Uganda
Concept: Epidemiology, risk factors, and surveillance gaps of leptospirosis
Context: Uganda.

Background Leptospirosis is a globally neglected zoonotic disease caused by pathogenic Leptospira bacteria. It is transmitted through direct or indirect contact with urine-contaminated environments, affecting both humans and animals. The disease presents with non-specific febrile symptoms, making it difficult to distinguish from other endemic infections such as malaria, typhoid, and viral hemorrhagic fevers. In Uganda, where multiple infectious diseases co-exist, leptospirosis remains largely underdiagnosed and underreported due to limited awareness, inadequate diagnostic capacity, and gaps in surveillance systems.
Uganda's diverse ecology, high rainfall, poor sanitation, and extensive human-animal interactions create an environment conducive to Leptospira transmission. Rodents and domestic animals serve as key reservoir hosts, shedding the bacteria into water and soil, increasing human exposure risk. Occupational and environmental factors, such as farming, fishing, and urbanization, further contribute to disease transmission. However, the true burden of leptospirosis in Uganda remains uncertain due to a lack of comprehensive epidemiological data.
This scoping review aims to synthesize existing literature on the epidemiology, risk factors, and surveillance gaps of leptospirosis in Uganda. By

identifying key knowledge gaps, this review will inform public health interventions, strengthen diagnostic and surveillance frameworks, and contribute to the global effort to combat leptospirosis in endemic regions.

Rationale Leptospirosis is a significant but neglected zoonotic disease in Uganda, however its true burden remains largely unknown. The disease presents with non-specific symptoms, leading to frequent misdiagnosis as malaria, typhoid, or other febrile illnesses. This diagnostic challenge results in underreporting and limited recognition in national disease surveillance systems. Given Uganda's environmental and socioeconomic conditions such as heavy rainfall, poor sanitation, high rodent populations, and extensive human-animal interactions the risk of leptospirosis transmission is significant.

Despite the public health threat posed by leptospirosis, there is a scarcity of epidemiological data and surveillance efforts in Uganda. Limited diagnostic capacity, lack of routine screening, and insufficient awareness among healthcare workers, community could contribute to the neglect of this disease. Without reliable data on disease prevalence, risk factors, and transmission dynamics, effective control and prevention strategies cannot be developed.

This scoping review is essential to establish existing knowledge on leptospirosis in Uganda, identify research gaps, and highlight areas requiring urgent public health interventions. By synthesizing current evidence, this study will support policymakers, researchers, and healthcare professionals in improving surveillance, diagnostics, and disease management strategies.

METHODS

Strategy of data synthesis This scoping review will employ a structured approach to synthesizing data from relevant studies on leptospirosis in Uganda. We shall follow the outlines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) Checklist.

The key components of data synthesis will include:

1. Descriptive analysis

Studies will be categorized based on key characteristics such as study design, geographical location, population studied (humans, animals, environment), diagnostic methods used, and year of publication.

A summary table will be created to present the distribution of studies by these characteristics.

2. Thematic analysis

Findings will be organized into major themes, including epidemiology, risk factors, clinical presentation, diagnostic approaches, surveillance efforts, and public health interventions.

Each theme will be analyzed to determine trends, commonalities, and gaps in knowledge.

3. Quantitative data synthesis

Where applicable, prevalence estimates of leptospirosis from different studies will be extracted and compared.

When possible, data visualization techniques, such as bar charts, pie charts, and maps, will be used to display disease distribution and risk factor patterns.

4. Qualitative data synthesis

Qualitative findings, such as challenges in surveillance and healthcare system limitations, will be synthesized narratively.

Insights from policy papers and expert opinions will be integrated to provide a comprehensive understanding of gaps in surveillance and research priorities.

5. Knowledge gaps

A summary of research gaps will be compiled, highlighting areas that require further investigation.

Recommendations for future research, policy development, and public health interventions will be provided.

Eligibility criteria

Inclusion Criteria

1. Study Population

Studies conducted in Uganda involving humans, animals (livestock, rodents, domestic pets), or environmental samples.

2. Study Design

Observational studies (cross-sectional, case-control, cohort studies).

Surveillance reports, epidemiological surveys, and public health studies.

Laboratory-based diagnostic studies related to leptospirosis detection.

3. Outcomes of Interest

Prevalence or incidence of leptospirosis.

Risk factors associated with human and animal infections.

Clinical presentation and diagnostic approaches.

Surveillance data and public health interventions.

4. Time Frame

All studies published todate

5. Language

Articles published in English.

Exclusion Criteria

1. Geographical Scope

Studies conducted outside Uganda, unless they provide comparative data relevant to Uganda.

2. Study Type

Editorials, commentaries, conference abstracts, and opinion pieces without primary data.
Studies focusing on leptospirosis in non-relevant contexts (e.g., experimental animal models not linked to Uganda).
3. Non-Specific Studies
Studies that mention leptospirosis but do not provide primary data or relevant analysis.
4. Duplicate Publications
Studies that are already included in systematic reviews, unless they provide new, disaggregated data.

Source of evidence screening and selection The process of evidence screening and selection for this scoping review will be conducted systematically using Covidence, a web-based tool designed to facilitate the management of systematic and scoping reviews. The following steps will be followed:

1. Identification of Sources
• A comprehensive search will be conducted in relevant databases to identify studies on leptospirosis in Uganda.
• Additional sources will include grey literature (theses, dissertations, and institutional reports), and surveillance data from WHO, CDC, and Uganda's Ministry of Health if available.
• References from included studies will be screened to identify additional relevant literature.

2. Importation of References into Covidence
• All retrieved studies will be imported into Covidence, which will be used to manage duplicates, facilitate blinded screening, and track study selection decisions.

3. Title and Abstract Screening
• Two independent reviewers will screen titles and abstracts based on predefined inclusion and exclusion criteria using Covidence.
• Any discrepancies in study selection will be resolved through discussion or by consulting a third reviewer.

4. Full-Text Screening
• Studies passing the initial screening will undergo full-text review to confirm eligibility.
• Covidence will assist in managing conflicts by allowing reviewers to highlight reasons for exclusion (e.g., irrelevant population, study design, or outcomes).

5. Data Extraction and Management
• Eligible studies will be selected for data extraction using a designed structured form within Covidence to capture key variables such as study characteristics, population, risk factors, and surveillance gaps.
• Studies will also under quality assessment check for relevancy of data extracted.

6. Final Selection and Inclusion
• Studies that meet all criteria will be included in the final synthesis. Covidence will generate a PRISMA flow diagram to document the number of studies screened, included, and excluded at each stage.

Data management Covidence will be used to facilitate the organization, screening, and extraction of data from selected sources.

1. Data Storage and Organization
• All retrieved studies will be imported into Covidence, where duplicates will be automatically identified and removed.
• A backup of all references will be maintained in EndNote/Zotero to ensure data integrity.
• Grey literature and reports not available in databases will be stored in a secure cloud-based repository for easy access and reference.

2. Data Extraction Process
• A structured data extraction form will be developed within Covidence to capture key variables, including:
• Study characteristics (author, year, title, study design, country)
• Population details (sample size, demographics, location)
• Risk factors and exposures
• Clinical presentation and diagnostic approaches
• Surveillance and public health interventions
• Key findings and recommendations

3. Quality Control Measures
• Inter-reviewer agreement will be assessed regularly to ensure consistency in data extraction.
• Extracted data will be cross-checked against full-text articles to minimize errors.
• A pilot test of the data extraction form will be conducted on a subset of studies before full-scale extraction.
• Two independent reviewers will extract data, and discrepancies will be resolved through discussion or a third reviewer.

4. Data Synthesis and Analysis
• Extracted data will be categorized based on themes (epidemiology, risk factors, surveillance gaps) for synthesis.
• Quantitative data will be summarized using descriptive statistics, while qualitative findings will be presented narratively.

• Data visualization tools, such as PRISMA flow diagrams, bar charts, and summary tables, will be generated using R software or Excel to enhance clarity in reporting.

5. Data Security and Confidentiality
• Access to the Covidence platform and cloud storage will be restricted to authorized team members.
• Sensitive data will be encrypted and protected using password-secured databases.

Reporting results / Analysis of the evidence The results of this scoping review will be reported following the PRISMA-ScR framework, ensuring a structured and transparent synthesis of evidence. The study selection process will be illustrated using a PRISMA flow diagram, detailing the number of records retrieved, screened, included, and excluded, along with reasons for exclusions. A summary table will outline the characteristics of included studies, including study design, sample size, geographical location, population type, and key objectives. The studies will be categorized based on major themes such as epidemiology, risk factors, clinical presentation, diagnostics, surveillance, and public health interventions.

Presentation of the results Findings will be visually presented using tables, bar charts, and geospatial maps to illustrate disease distribution, prevalence trends, and associations with risk factors.
The discussion will place findings in the context of regional and global evidence, highlighting research gaps, policy implications, and recommendations for future surveillance, diagnostics, and public health interventions.

Language restriction English.

Country(ies) involved China, Uganda, Togo, United Kingdom, USA.

Keywords Leptospirosis; Uganda; Epidemiology; Public health; One Health; Emerging infectious diseases; Disease surveillance; zoonoses.

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