SYSTEMATIC REVIEW

A Systematic Review of Health Literacy Status Among Local Community in Protected Area

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ABSTRACT

Introduction: Protected areas (PAs) play a vital role in conservation but often impose restrictions that limit economic and educational opportunities for local communities. These constraints can negatively affect health literacy (HL), particularly in rural populations exposed to zoonotic diseases and environmental health risks. This systematic review aims to explore how living in protected areas influences health literacy status, with a focus on knowledge, attitudes, and practices (KAP) related to health risks. **Methods:** A systematic search was conducted across PubMed, Scopus, and Web of Science for studies published between 2014 and 2024. Articles were screened based on the PEO framework, and eligible studies were appraised using the Joanna Briggs Institute (JBI) Critical Appraisal Tools. A thematic synthesis was performed to identify common factors influencing HL among adults living in or near protected areas. **Results:** Nine studies met the inclusion criteria. Most studies assessed HL indirectly through KAP related to zoonotic diseases. Findings revealed that residents in PAs often demonstrated low awareness of disease transmission, poor preventive practices, and limited access to health information. Key influencing factors included low education levels, poverty, occupation (e.g., hunting, farming), and poor access to healthcare. Only communities exposed to prior outbreaks or targeted health programs showed improved HL. **Conclusion:** Communities in PAs exhibit generally low health literacy, shaped by structural inequalities and ecological constraints. Interventions should prioritize community-based health education, cross-sector collaboration, and culturally tailored messaging. Addressing HL in PAs is critical to reducing health disparities and achieving sustainable development goals (SDGs).
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Keywords: Health literacy, Health status, Local community,Protected areas, Systematic review

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INTRODUCTION

Protected areas (PAs), characterized by their unique ecosystems and biodiversity, are crucial in preserving the world's natural heritage. These areas are often subject to stringent restrictions to safeguard the delicate balance of their ecosystems, posing challenges for the local communities residing within these PAs. The convergence of restricted economic opportunities and limited educational access in these PAs contributes to a socioeconomically disadvantaged population [1-4]. Consequently, health literacy (HL) within these communities faces significant hurdles, leading to deficiencies in knowledge, attitudes, and practices related to disease prevention [5-6].

Imposing restrictions on PAs is imperative for biodiversity conservation, preventing habitat destruction, and maintaining ecological equilibrium. However, these restrictions often result in limited economic opportunities for the local communities, hindering their access to education and healthcare services. The scarcity of educational resources and economic opportunities further exacerbates the cycle of poverty and restricts upward mobility within these communities [7-10].

The intersection of low socioeconomic status and restricted educational access creates an environment where HL is compromised. HL encompasses an individual's ability to access, understand, and apply health information to make informed decisions about their well-being [11,12]. In the context of PAs, the lack of access to quality education and limited economic prospects contribute to a population with lower HL levels.

This diminished HL manifests in inadequate knowledge, attitudes, and practices related to disease prevention and health awareness. The communities in these PAs may lack the necessary information about prevalent health risks, proper hygiene practices, and the importance of preventive measures [5-6]. As a result, the communities may face heightened vulnerabilities to various health threats, leading to an increased incidence of preventable diseases.

Understanding the dynamics of HL within local communities residing in PAs is crucial for designing targeted interventions to bridge the knowledge gap and improve preventive healthcare practices. For instance, studies in Uganda, Madagascar, and Southeast Asia have shown that communities near or within national parks face barriers such as limited access to education, unreliable infrastructure, and weak integration with national health systems [13-16]. Almost 70% of community living near the Lake Mburo National Park (LMNP), had never received formal health education, and literacy rates were significantly below the national average [14]. These challenges restrict the dissemination and uptake of vital health information, leading to poor awareness of disease prevention, hygiene, and vaccination. When health messages do reach these communities, linguistic and cultural gaps often prevent them from being fully understood or applied [14-16].

There is a clear and urgent need to address these limitations, as low HL in these communities directly contributes to poor health outcomes and increased vulnerability to disease outbreaks, particularly zoonotic infections. The restrictive policies that aim to protect biodiversity unintentionally marginalize local populations by limiting income opportunities and access to essential services. These structural factors reinforce a cycle of poverty, low educational attainment, and health illiteracy. This review aims to make this correlation more explicit, showing how systemic constraints within protected areas lead to measurable deficiencies in HL. By doing so, we highlight the need for more equitable, integrated health and conservation strategies.

This study contributes to the limited body of literature exploring HL in protected areas, offering valuable insights for stakeholders including public health authorities, environmental policymakers, NGOs, and researchers. By identifying the root causes and patterns of limited HL, this review provides a basis for developing culturally sensitive, community-driven interventions. Ultimately, our findings emphasize that improving HL is not only essential for individual and community well-being, but also for the long-term success of conservation and sustainable development initiatives.

For this review, health literacy (HL) was operationally defined as an individual's ability to access, understand, and apply health-related information to make informed decisions about their health [17]. As none of the included studies used standardized HL instruments (e.g., HLS-EU-Q47 or HLQ), this review assessed HL through reported outcomes related to knowledge, attitudes, and practices (KAP) concerning disease prevention and health behaviors. These proxy indicators were used to infer the functional health literacy of the populations studied.

METHODS

This systematic review followed a structured approach based on the PRISMA guidelines to identify, select, and synthesize studies related to health literacy among communities living in or near protected areas [18-19]. The review process was guided by the Population, Exposure, and Outcome (PEO) framework to ensure transparency and methodological rigor. Details of the inclusion and exclusion criteria are presented in Table 1.

Table I: PEO Structure

Items	Keywords	Search Terms	Search Strategy
Population	Population in protected areas	Population	(popula*) OR (Communit*) OR (societ*) OR (people) OR (group) OR (citizen*) OR (native) OR (residen*) OR (indigenous) OR (Orang Asli) OR (aborigin*) OR (deme) OR (inhabitant) OR (occupant*) OR (settler*) OR (vulnerable*)
Exposure	Protected area	Protected area	(protect*) OR (conserv*) OR (reserve*) OR (preserv*) OR ("wilderness area*") OR (monument*) OR ("natural feature*") OR ("management area*") OR (landscape*) OR (refuge*) OR (park*) OR ("botanical garden") OR (sanctuar*) OR (corridor*) OR ("national park*") OR (bioreserve)
Outcome	Health literacy	Heath literacy status	("health literacy") OR ("health intervention") OR ("health training") OR ("health education*") OR ("health knowledge") OR ("health curriculum") OR ("health awareness") OR ("health competen*") OR ("attitude to health") OR ("health class") OR ("medical education*") OR ("medical knowledge")

Bibliographic Database

The literature search encompassed three database sources: Scopus, Web of Science (WOS), and PubMed. Initially, a limited exploration of Google Scholar was conducted to formulate concepts and key terms for the two focal points of health literacy and protected areas. Following this, a comprehensive search for issue classification was executed through Cochrane or Cochrane-related databases, such as International prospective register of systematic reviews (PROSPERO), to pre-emptively identify any overlapping topics with the existing study [20]. Subsequently, a full search strategy was implemented using synonyms derived from MESH definitions and previous review papers discussing similar keywords.

The literature retrieval search strategy included article titles, keywords, years of publication, and authors from all three database sources. The search criteria were refined to prioritize peer-reviewed articles for consistency and systematicity, encompassing publications in English. The search results were exported to Excel and EndNote for reference management.

Ethics, Protocol Writing and Registration

The ethics approval number was obtained from Universiti Sains Islam Malaysia (USIM) (USIM/JKEP/2022-216). Additionally, in preparation for the systematic review, adherence to protocol study registration guidelines was ensured to maintain transparency and mitigate duplication concerns. The study protocol was registered in PROSPERO (registration CRD42022323343), utilizing the PROSPERO-approved layout of a protocol template.

Search Terms

The search strategy aims to find a published and open-access study. The search strategy applied the following steps. Initially, a limited search was performed through google scholar to develop concepts and key terms for three pre-defined concepts: concept 1 (health literacy, health intervention, health education, health knowledge, health awareness or health competency), concept 2 (popula* OR Community OR societ* OR people OR group OR citizen* OR native OR residen* OR indigenous OR Orang Asli OR aborigin* OR deme OR inhabitant OR occupant* OR settler* OR vulnerable*) and concept 3 (protected area, conserve, reserve, preserve, wilderness area, natural feature, landscape, park or botanical garden). Then, a full search was carried out using all identified keywords of each concept and index terms across three databases: PubMed, Scopus, and Web of Science (WOS). These databases were selected for their comprehensive coverage of peer-reviewed literature across health, social sciences, and interdisciplinary fields, ensuring a broad and rigorous search for relevant studies on health literacy in community and protected area settings. Concepts 1, 2, and 3 will be connected using 'AND' and run in search strategy in the three databases. Next, from the databases, the duplicated studies were identified and eliminated. Then, titles and abstracts were screened, and the relevant studies were selected for a full-text critical appraisal. Finally, the reference list of all identified studies was searched for additional studies. The result of this search strategy presented a schematic presentation of the whole search strategy process using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Eligibility, Inclusion and Exclusion Criteria

Eligibility criteria, serving as guidelines for article inclusion or exclusion, were established based on the PEO framework outlined in Table 1. Inclusion criteria encompassed articles published in the last ten years (2014-2024), written in English, and with full-text accessibility. The population under consideration included individuals aged 18 and above, whether healthy or unhealthy. Exclusion criteria involved articles not peer-reviewed, non-scholarly articles (e.g., editorials, commentaries, blogs) and publications exceeding the research scope, such as studies focusing on health literacy among urban populations, general populations not residing in or near protected areas, or studies addressing unrelated health outcomes.

Article Screening

Article screening involved downloading search results to an Excel spreadsheet, alphabetizing the title list to eliminate redundancy, and removing duplicate items and non-English content. Two reviewers independently screened titles, abstracts, and full texts for eligibility, documenting inclusion and exclusion decisions at each stage.

Study Quality Assessment

The study quality assessment was assessed using Joanna Briggs Institute (JBI) Critical Appraisal Tools [21]. It ensures that the systematic review's findings are based on reliable and well-conducted studies, allowing stronger studies to be given more weight and weaker ones to be interpreted with caution. The reviewers utilized a study quality assessment checklist comprising eight evaluation criteria, encompassing: (1) research goals; (2) study designs; (3) study outcomes; (4) sample size calculations; (5) findings analysis; (6) variance estimate for the primary results; (7) adequate reported results; and (8) conclusion.

A quality score was assigned based on the satisfaction of these criteria, with "2 points=criterion fully met", "1 point=partial met", and "0 points=not met". The total

possible score was 16. Studies scoring "13–16 were categorized as high quality", "9–12 as moderate quality" and "8 or below as low quality". These quality levels were used to guide the weight of findings in the synthesis. High-quality studies contributed more substantially to the interpretation of results, while lower-quality studies were noted with caution [20].

Data Coding Strategy and Potential effect modifiers/ reasons for heterogeneity

This study employed thematic synthesis, a technique commonly utilized in qualitative research within the context of a systematic review [21]. This approach prioritizes identifying, evaluating, and interpreting meaningful patterns within qualitative data. Initially, the research aimed to extract information in response to the review questions concerning the community's health literacy level and exposure to protected areas.

The synthesis method involved a two-step coding procedure, wherein reviewers independently coded each line of text for its meaning and substance. Subsequently, each article received a code label to categorize the data into similar subjects. Before concluding this synthesis step, a thorough analysis of every text associated with a specific code was conducted to ensure the consistency of interpretation.

Data Analysis

Thematic synthesis

The researcher meticulously analyzed the data to identify recurring themes, encompassing subjects, ideas, and patterns of meaning. The most common technique for thematic analysis, involves six steps: familiarization, coding, generating themes, evaluating themes, defining, and labelling themes, and writing up [22].

In the familiarization step, the researcher read the material and took notes to gather information. Coding involved identifying meaningful phrases or sentences and assigning codes to elucidate their contents. The subsequent step was to generate themes by scrutinizing the codes and identifying patterns among them, establishing pertinent topics relevant to the community's health state. Codes that were excessively ambiguous or irrelevant were excluded.

The next stage involved reviewing the generated themes to ensure that they effectively conveyed the data in a usable and accurate manner. The authors engaged in discussions among themselves and revisited the dataset to cross-verify the themes, leaving no room for oversight. Once all requirements were met, the themes were defined and labelled. Defining themes involved articulating precisely what each topic meant and understanding its contribution to the data comprehension. The process of naming themes entailed creating concise and readily accessible names for each subject. Finally, the researcher commenced the writing-up phase of the data analysis, summarizing and presenting the identified themes in the study.

RESULTS

The result of this study was to explore the health literacy status among rural communities surrounding the protected areas. Based on the systematic review, the results and the flow of the study selection are shown in Figure 1. 9 articles were finally considered and included in this review and assessed for methodological quality, with results reported in Table 2. The most recent article was published in 2024 [19], while the oldest was published in 2014 [13]. Among all, (n=3, 33.3%) of studies were conducted specifically at Uganda's National Parks, namely Murchison Falls National Park, Bwindi Impenetrable National Park, and Lake Mburo National Park. The other studies were conducted at Nigerian National Parks, Limpopo National Park in Mozambique, Kosumpee Forest Park, Maha Sarakham, Thailand, Ranomafana Rainforest in Madagascar, the Reserve Area of Zambia, and National Parks in the United States.

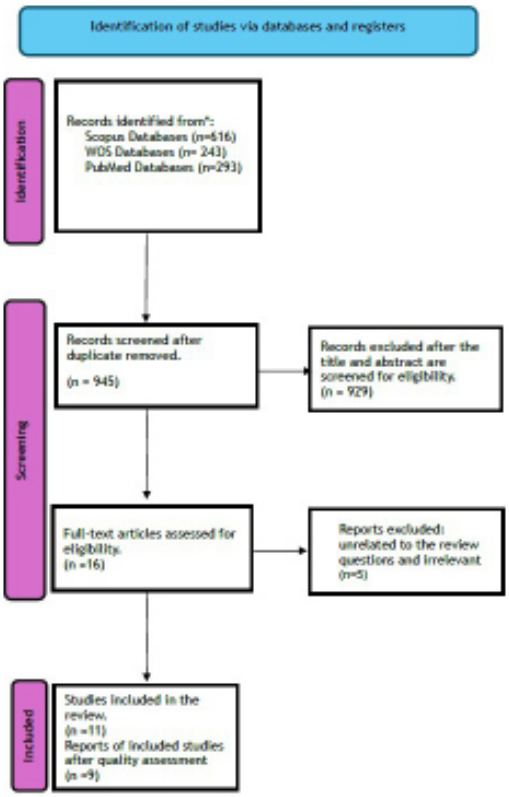

Figure 1: PRISMA flow diagram showing the study selection process for the systematic review, including identification, screening, eligibility, and inclusion stages.

Table II: Summary of Studies Identified for Systematic Review Detailing Participants, Socioeconomic and Health Literacy Status

No	Author	Objectives	Methodology	Main Findings	QA (%)
1	Osunsina et al. (2023)	To assess socio-economic predictors of local people's needs around Nigerian National Parks and establish the link between biodiversity conservation and rural development	Quantitative: Questionnaires to 1500 respondents from 106 communities.	Majority of respondents are male (73.2%) and engaged in farming. High levels of illiteracy, especially in communities near Gashaka Gumti (61.5%), Kainji Lake (63.1%), and Old Oyo (68.1%). Community expectations focused on health centers (78.5%), boreholes (77.7%), and roads (68.6%). Socio-demographic factors like gender and age influence infrastructure needs.	87.5
2	Mapatse et al. (2022)	to assess the knowledge, attitudes, and practices amongst selected households and health practitioners in one affected area, the Limpopo National Park (LNP), Massingir district	Quantitative: A cross-sectional study	Both households (HH) and health practitioners (HP) displayed poor levels of knowledge and bad attitudes and practices towards rabies. HH, had more gaps in their attitudes and practices towards the disease. Factors such as village location and education level, sex and occupation, were found to be statistically associated ($P < .05$), with good knowledge of rabies among households as compared to HPs. Overall, a lack of community-based education (HH) and professional retraining courses contribute (HP) significantly to poor awareness of rabies. Government should enhance public health knowledge. Approximately 18.9% (95% CI: 14.3–24.3) and 13.3% (95% CI: 9.4–18.1) of households had good knowledge and practices of rabies, respectively. For health practitioners, only 16.7% (95% CI: 7.5–31.9) had good knowledge, whilst 33.3% (95% CI: 20.0–49.7) adopted adequate attitudes/practices towards the disease.	100
3.	Rahantamalala et al. (2022)	Assessing the prevalence of T. solium infections and risk factors in twelve remote villages surrounding Ranomafana National Park (RNP), Ifanadiana District, Madagascar.	Quantitative: cross-sectional survey, stool and blood sample	The overall seroprevalences of anti-cysticercal IgGs found by EITB and ELISA (27.5% and 29.8%, respectively) were comparable. Circulating cysticercal antigens showing cysticercosis with live cysts were found to have a prevalence incidence of 12.4%. Promiscuity with households larger than four individuals (OR = 1.9, 95% CI: 1.1–3.1) and open defecation (Odds Ratio, OR = 1.5, 95% CI: 1.0–2.3) appear to be the primary risk variables linked to the discovery of antisticercal antibodies. A risk factor for having active cysticercosis would be being older than 15 (OR = 1.6, 95% CI: 1.0–2.7). The likelihood of having cysticercosis with viable cysts was lower in females (OR = 0.5, 95% CI: 0.3–0.9) and those who used rivers for their home's water supply (OR = 0.3, 95% CI: 0.1–1.5).	87.5
4.	Alvarado et al. (2022)	To determine self-reported exposure to triatomines and to assess KAP regarding Chagas disease (CD) of NPS employees	Quantitative: KAP survey (emailed)	The results indicated a high self-reported bite exposure in NPS dwelling (OR=10.32, 95% CI, 95% CI: 2.41 -53.71; $p<0.01$). Certain actions, such replacing window screens frequently or consistently, were linked to a lower chance of potentially being exposed to triatomine bugs (OR=0.21, 95% CI: 0.04 - 0.93, $p = 0.02$). Furthermore, NPS staff members had low knowledge about CD. There was no correlation between higher CD knowledge and more frequent preventive behaviour ($n = 86$; $r = -0.21$; $p = 0.05$). The findings showed that a higher level of personal agency to lower the risk of CD was linked to a higher level of CD anxiety ($n = 86$; $r = 0.24$; $p = 0.02$).	100

CONTINUE

Table II: Summary of Studies Identified for Systematic Review Detailing Participants, Socioeconomic and Health Literacy Status. (CONT.)

No	Author	Objectives	Methodology	Main Findings	QA (%)
5.	Damrongsukij et al. (2021)	to measure the prevalence of gastrointestinal parasitic infections and melioidosis in long-tailed macaques at Kosumpee Forest Park and measure associated risk factors of their diseases among people in this area.	Quantitative: A cross-sectional survey	The result found that seroprevalence of melioidosis was 57.1% from macaque samples. The prevalence of gastrointestinal parasites infection was 35.11% from fecal samples, including Strongyloides spp. (15.27%), Trichuris spp. (22.9%), hookworm (4.58%) and Ascarid spp. (1.53%). KAP study indicated that the level of knowledge related to melioidosis and gastrointestinal parasites of people in the area was very low (<30% of all groups) and moderate (>50% of all groups), respectively. The attitude of respondents who were aware of the diseases was at a moderate level for melioidosis and a high level for parasitic infection.	75
6.	Muylaert et al. (2021)	To investigate human and animal contacts and human health in a community living around the Bwindi Impenetrable National Park (BINP), Uganda	Quantitative: Questionnaires Diary Questionnaire	Direct contact with domestic and wild animals, and proximity with different kinds of animals, are the factors of pathogen transmission. The findings shows that local community that is experiencing repeated symptoms of sickness (headache and tiredness) is highly exposed to these factors. Health status among the population: Poor health. lack of nutrition, drinking un-boiled water, and malnourished	87.5
7.	Dell et al. (2020)	To gain insights into bushmeat preferences, opportunity for zoonotic pathogen transmission, and awareness of common wildlife-associated zoonoses	Quantitative: - face to face interview using survey	Cooks preferred to eat domestic meat (more nutritious). While hunters preferred bushmeat. All respondents were aware of the risk of disease transmission from wildlife to people (learns from epidemics) but not for hunters. Cooks and hunters have knowledge about zoonotic infection from animals to humans. They believe that wild animals were most likely to carry disease livestock could catch (3.55± 1.18), people (3.5±1.19) and dogs could catch (3.37±1.3).	100
8.	Lehman et al. (2017)	We used these observations and the results of the household-level surveys to develop recommendations to mitigate and control future spread of the infection to humans, animals, and the environment.	Quantitaive: cross-sectional survey.Face to face interview and observation	238 participants (84%) ate hippopotamus meat during the outbreak. Meat eaters were 9 times (95% CI, 1.3–369.3) more likely to report anthrax. Anthrax infection was also related with carrying and cooking hippopotamus flesh (OR= 5.3, 95% CI 2.0–15.4). After adjusting for eating hippopotamus meat, skinning, carrying, and chopping the meat remained strongly related with anthrax infection. 65 participants (23%) still eat dead hippopotamuses even though they know about it. Visited field sites showed human interaction with deceased hippopotamuses.	75
9.	Kansiime et al. (2014)	to assess knowledge and perceptions of brucellosis among pastoral communities adjacent to Lake Mburo National Park (LMNP), Kiruhura District, Uganda	Quantitative: cross-sectional survey	279 participants (19%) were aware of the signs and symptoms of brucellosis in animals, but 75.5% of them stated that joint and muscle discomfort was a symptom. Two thirds of population (67.7%) thought that living near wildlife contributed to the disease's existence. 97% of respondents were aware that eating unpasteurized dairy products, half-cooked meat, and contaminated pasture consumed by animals (97.4%) were the infection vectors. The general level of knowledge on brucellosis was moderate, at 197 (53.1%). Being an agro pastoralist (aOR: 2.08, CI: 1.17-3.71) as opposed to a pure pastoralist was related with better overall knowledge, while those who indicated that the disease was a health problem (aOR: 0.18, CI: 0.06-0.56) as opposed to those who said it was not less likely to be knowledgeable.	100

Almost all studies (n=6, 66.6%) discussed the knowledge, attitude, and practice (KAP) of the local communities regarding the transmission of zoonotic infections such as pathogens [13-14], rabies [14] brucellosis [23], melioidosis and gastrointestinal [24] and triatomine [25] from animals to humans. While another studies (n=3, 33.3%) discovered the prevalence of Taenia solium taeniosis and cysticercosis infections and the associated risk factors among several remote villages surrounding the PAs [26] and the role of food insecurity in the local community and the risk of being infected with anthrax [16].

Health Literacy

Communities living in PAs had different levels of knowledge, attitude, and practice regarding zoonotic diseases. These communities often reside in areas with unique ecological and environmental characteristics, which can impact their understanding and approach to health-related issues.

In some PAs, communities understand the health risks associated with their environment [13-14, 25-26]. They know the causes and symptoms of the disease and how to prevent it very well because, commonly, they are exposed to the outbreak. They also have a good attitude in believing that wildlife animals are the leading causes of the risk of disease spillover and infections. However, they practically did not apply their knowledge to prevent the disease. Hunters love to eat bushmeat rather than domestic meat. During the poaching, hunters' awareness did not influence any precautionary behavior unless they feared being caught for legal or financial repercussions [14]. The communities ignored the risk of contracting infections and diseases as they ate uncooked meat [24] and dead animals [27].

In the other PAs, the overall knowledge of the causes, symptoms, and modes of disease transmission was deficient [14,15,26]. The communities in these PAs cannot respond correctly to the diseases. Only 10% of respondents answered correctly regarding rabies [24]. They know that rabies can be cured through vaccines, but only 30% of the communities vaccinated their dogs, and the rest did not. A survey done among the Southwestern National Parks services in Texas found that only 19.3% of the respondents knew about Chagas disease (CD), and 35.9% believed that CD was a serious illness in the surrounding area. The communities may exhibit low levels of knowledge, negative attitudes toward disease prevention, and poor practices.

Factors Associated with Health Literacy

Most studies (n=7, 77.7%) conducted in various settings [13-16,24-26] had meticulously explored the sociodemographic conditions prevailing in local communities. These areas commonly exhibit low income, substandard village location, a predominant agricultural occupation, household size, and limited educational backgrounds, which influence the knowledge and practice regarding zoonotic diseases. Studies identified multiple sociodemographic and contextual factors influencing HL. Limited formal education, especially among older adults, was a recurring theme [13, 26]. Occupation (e.g., subsistence farming, hunting), household size, gender roles, and food insecurity were also commonly associated with low levels of health-related knowledge and unsafe practices [14, 27]. Importantly, proximity to health facilities, exposure to past outbreaks, and participation in health campaigns were positively associated with better understanding and safer behavior [16, 24].

The Need for Community Engagement, Wildlife Management, and Public Health Authorities in the Protected Areas

The imperative of community engagement and collaborative efforts with authorities in managing health challenges within specific locales is a recurring theme across all referenced studies [14-15]. Notably, the studies illuminate a critical gap in public awareness regarding the significance of vaccinating animals as a preventive measure against spreading diseases and infections. A study further advocates for establishing a veterinary outreach program in PAs to actively monitor and sustain the health of both wildlife populations and domestic animals, thereby mitigating the risk of zoonotic diseases [14].

In case of interventions, multiple studies [13,24,26] stress the pivotal role of health education initiatives sponsored by authorities. These efforts aim to elevate awareness within local communities, covering diverse aspects such as waste management, disease prevention, and the interrelation between wildlife and human activities. Additionally, strategic interventions proposed in the literature encompass improvements in living conditions [15], targeted medical retraining for health practitioners [24], and proactive measures to address food insecurity concerns [27]. This collective discourse underscores the multifaceted approach required for effective public health management, advocating for comprehensive community engagement and sustained collaboration with authorities to address the complex interplay of factors contributing to health challenges in diverse settings.

All the included studies in Fig. 1 reported demographic factors among the populations. We now summarize the key findings on the issue of HL among local communities living in the PAs in Table 2.

DISCUSSION

This systematic review critically appraises the health

literacy situation among individuals residing in or around protected areas (PAs). During the study, there was a trend toward inadequate health literacy, negative attitudes, and risky health behavior, especially toward zoonotic diseases. These were primarily based on structural determinants like poverty, low educational levels, restricted access to health infrastructure, and entrenched cultural beliefs.

There is an existence of comparative results that can be seen when contrasting knowledge-practice gaps across settings. Whereas some research reported moderate knowledge on zoonoses such as brucellosis, rabies, and melioidosis, health practices were unsafe or irregular [13-15]. The gap was larger in distant or underserved communities, where environmental and cultural barriers hindered behavior change. Conversely, communities with earlier exposure to outbreaks or institutional exposure to health education revealed better practice and attitude, indicating that exposure and outreach contribute significantly to implementing knowledge [16,25].

These results capture heterogeneity of health literacy levels by different protected areas and nations due to differences in the provision of health services, levels of education, and outreach activities. For instance, while others had high health literacy and enhanced protective behavior against intense health campaigns, others, especially those from poor areas or under tight conservation regulations, did not know about basic prevention practices such as avoiding contact with dead animals [26, 27].

Determinants, including education, economic status, work, and exposure to wildlife, were always previously known they influence the health literacy results. On the contrary, well-educated communities with diverse livelihoods had the means, understanding, and use of health information. In contrast, poor subsistence and health-access communities never possessed the requisite minimal literacy competencies to contend with health dangers [15,24]. These results agree with larger studies indicating that lower health literacy disproportionately exists among rural and socioeconomically disadvantaged populations [28-29].

Most notably, the review identifies a worldwide appeal across environments for community-based, context-tailored interventions. Irrespective of geographic or socioeconomic environment, local mobilization, inter-sectoral coordination (specifically with conservation and wildlife agencies), and culturally tailored education programs were prioritized [14,26]. This reinforces global health hypotheses suggesting a transition from individual-level interventions to structural, system-level interventions involving multiple stakeholders [30-32].

The study findings show that local community health literacy in communities residing in, and around protected areas is relatively lower than that of national or urban communities, owing to structural inequalities and context-specific barriers. Inadequate health literacy in such places demands multi-dimensional and multi-sectoral approaches, such as culturally tailored education, long-term community mobilization, improved infrastructure, and coordinated policy support from health, conservation, and social sectors. Without such efforts, these groups will be disproportionately at risk for disease outbreaks and other health concerns.

While the review provides critical insights into the relationship between health literacy and life in protected areas, several limitations should be acknowledged. First, most included studies focused on zoonotic diseases and may not fully capture broader health literacy dimensions such as mental health, nutrition, or chronic disease management. Second, there is a geographic concentration of studies in certain African and Southeast Asian countries, limiting global generalizability. This review aligns with SDG 3 (Good Health and Well-being) by highlighting health disparities in vulnerable populations, and SDG 10 (Reduced Inequalities) by calling for targeted policy and program interventions that reach marginalized communities in protected areas.

CONCLUSION

In conclusion, the study underscores the prevailing issue of low HL within communities residing in PAs, primarily stemming from insufficient health awareness. The limited access to education and economic opportunities exacerbates this challenge, resulting in deficient knowledge, attitudes, and practices related to disease prevention. The imperative for intervention is evident, and a collaborative approach involving authorities and wildlife management is crucial to addressing these gaps.

To improve HL in these communities, suggested interventions include targeted health education initiatives tailored to the local context, community engagement programs, and specialized training for healthcare providers. Beyond economic concerns, future research should examine how digital platforms can support remote health education, investigate gender and age-specific literacy gaps, and assess culturally responsive communication methods in resource-restricted settings. Such multi-dimensional strategies will enhance health outcomes and contribute to resilience and self-sufficiency within communities in protected areas. A clear and sustained integration of health and conservation goals is essential for long-term impact.

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