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Article

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Review

What Remains Unsolved in Sub-African Environmental Exposure Information Disclosure: A Review

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Abstract: Background: Africa comprises the bulk of struggling economies. However, Sub-Saharan Africa is experiencing rapid industrialization and urbanization. Excessive resource use, pollution, and the absence of relevant environmental disclosure are factors that contribute to these human-made damages. Environmental pollution as a threat to sustainable development results from these damages. Although it has been established that Sub-Saharan Africa would benefit from resource-management development, sustainable environmental strategies, and a reduction in urbanization and persistent poverty, the information on these issues has not been made public. Objective: To provide a full account of the level of environmental-exposure disclosure in Sub-Saharan African countries, including the current level of progress, gaps, and prospects, we reviewed the literature on environmental exposure information research in African populations. Methodology: We searched PubMed and Google Scholar for peer-reviewed research articles, reviews, or books examining environmental exposure and information disclosure in human populations in Africa. Results: In total, 89 full-text articles were eligible for the inclusion criteria. A quality assessment of the retrieved articles using the PRISMA guidelines resulted in the exclusion of 40 articles; therefore, 49 studies were included in the final analysis. In Sub-Saharan Africa, the environmental exposure information on household injuries, the use of chemicals such as pesticides in farming, industry-linked vectors and diseases, laboratory chemical exposure, industrial exposure, and epigenetic factors are not well-disclosed to the population. Conclusion: Environmental information disclosure standards should be incorporated into central-government policy recommendations. Standards should identify polluting industries, and companies should refrain from the voluntary disclosure of environmental information to manage their reputation. Heavy-pollution industries should be made sufficiently transparent to lessen the company-media collusion on information disclosure.

Keywords: environmental exposure; information disclosure; Sub-Saharan Africa; pollution



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1. Introduction

Africa is the second largest and the second most populated continent in the world, with 54 states. This large continent is not only rich in cultural diversity but also boasts significant natural diversity (Fieno et al. 2016). Throughout its history, Africa has been plagued by political instability, war, and economic stagnation (Aluko and Obalade 2020). Modern African nations, however, are moving in the direction of long-term growth and development. Although isolated communities rely on hunting and subsistence farming, populations are still increasing, despite low levels of education and poverty. This fast-growing population is posing a number of serious problems, including environmental exposure (Adams and Opoku 2020). According to the predictions of the United Nations, by 2070, the bulk of the world's population growth will occur in the African continent. The combination of the increasing population, urbanization, and industrialization with the lack of attention to energy and environmental sustainability pose a major threat to the

African continent. For instance, the use of pesticides and exposure to heavy metals and other city pollutants are now affecting the population due to climate-change-induced heavy downpours on already deforested landscapes (Koné et al. 2019).

As in any other rapidly developing nation, the rapid rate of urbanization in Sub-Saharan African nation is accompanied by issues such as excessive resource use, pollution, and the absence of pertinent environmental disclosure. This, in turn, favors conditions conducive to environmental pollution, posing a threat to long-term development (Zhang et al. 2020). Environmental information disclosure is a recently developed tool of environmental governance (EID). Due to their increased visibility, mining companies in South Africa invariably disclose not only environmental but also social information (Davies et al.; Anshelevich et al. 2021). The level of social disclosure was found to be lower in smaller companies compared to larger companies. Although normative isomorphism favors larger companies, since their fields have reached maturity and are corporate entities in their own right, smaller companies, despite robust disclosure on the environment, still require some improvements in social disclosure (de Villiers et al. 2014).

In Sub-Saharan Africa, fires from hot substances and heat are an increasing global loss, both in terms of resources and in human lives. While it is established that disclosing the morbidity and mortality surrounding these environment-related incidences could be a robust preventative measure and improve the lives of the population, information regarding the measurement of environmental exposure to fire from poor infrastructure and the application of safety measures would help to prevent the occurrence of fire incidents to some extent (James et al. 2020). Notably, the disclosure of more environmental information based on environmental performance has not been standardized between government competition and public participation. For instance, in formulating practical environmental pollution control policies based on PM10 assessment, urban air quality management, as described in Blue-Sky Defense War, is predicted to ensure the achievement of air management. However, other factors, including transparent and timely information disclosure to the public and consistent and effective environmental governance policies with a series of structural adjustments, are required to ensure the effectiveness of the Blue-Sky Defense War (Embiale et al. 2021; Thabethe et al. 2021). It is apparent that the direction of sufficient policy and technical support toward a particular sector may curb the further degradation of the eco-environment caused by urbanization. While technical and political support are proven to aid in improving sustainable regional planning, further restrictions on urbanization agendas will also be monitored (Tularam et al. 2021). Once information disclosure is eminent, city dwellers and the administrative function will share attitudes with regard to transparency. Again, this will enable policymakers to establish sustainable policies that will be geared towards balancing the health of the environment and urbanization.

According to an economic analysis, the fastest-growing continent is Africa, and an estimated 350 million of its people are now in the middle class (Ezeudu et al. 2021). It is obvious that this implies the greater importation of consumer goods, robust information technology, and the development of communication. The rise in the importation of consumer goods leads to an accumulation of general waste and e-waste. For instance, due to poor infrastructure, highly toxic residues are treated inadequately (Assemu et al. 2020). Even though some informal recycling sites exist, the direct effect of the importation of goods to Sub-Saharan Africa with regard to the subsequent waste and environmental contamination is neither well-documented nor disclosed to consumers (Henríquez-Hernández et al. 2017). In addition to economics, natural environments, and societal conflicts, Sub-Saharan Africa is equally facing human-made environmental issues, such as rapid city growth, deforestation, the loss of productive topsoil, and poor-quality fresh water. To an extent, these can be blamed on climate change; however, interactions between people and natural resources also account for these hazards (Cudjoe and Acquah 2021). Even though it is established that, with a focus on resource management development and sustainable environmental strategies in the Sub-Saharan Africa region, issues ranging from urbanization, reductions

in persistent poverty, and environmentally friendly industrialization are minimized, since the information on these issues is not disclosed (Tauringana 2019).

Despite the fact that Africa remains the continent that is most affected by the degradations of the environment, which is reflective of the climate-change-related consequences in the region, less or no empirical credence has been attached to this problem to institutionalize Africa's environmental sustainability. The government and institutions governing the protection of ecological sustainability and preservation have a major role to play. However, one of the hindering factors is insufficient data (Adekunle 2021). In addition, the mixed results of firm performance research and CSR for developed economies have left obvious gaps with respect to Sub-Saharan Africa (Sampong et al. 2018). To offer a full account of the gaps in the environmental exposure disclosure in Sub-Saharan African countries, the current level of progress, and future prospects, we reviewed the literature on environmental exposure information research on the African population.

Within the theoretical framework of stakeholder theory, much attention is focused on those who influence organizations and those who are influenced by them in turn. These stakeholders can influence the firm or manager to reconsider organizational activities with respect to environmental exposure and the information disclosed to the public. Moreover, the legitimacy theory of the relationship between companies and their employees in the community elucidates the need for the company to establish standards and ethics through integrity and to be environmentally responsible. This is essential to the both the company's operations and the sustainability of the health of communities. For instance, the empirical studies on the effects of carbon performance on financial performance show a positive relationship between the two. Moreover, environmental disclosure has a significant positive effect on mean financial performance, according to a study conducted in Nairobi, Kenya. In South Africa, an assessment of the financial performance in terms of the return on investment of 10 companies conducted over 10 years demonstrated a positive association between social disclosure and return on investment. However, a negative relationship was revealed between environmental disclosure and return on investment. Market value and the corporate environmental disclosure of listed companies in Nigeria also revealed that the inclusion of environmental disclosure enhances market value; thus, environmental activities negatively affect the value and investment in areas that enhance value for firms (Thabethe et al. 2021). The fact that information of this nature is not made clear to the public is an example of an unresolved issue in public disclosure, which should be an area of significant scholarly interest.

2. Methods

This systematic review was conducted to assess the unresolved issues in Sub-Saharan African environmental exposure information disclosure. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2009 guideline was used when screening studies for eligibility. The database used to search for studies was PubMed. An additional search was performed with Google Scholar. The search terms included: 'Africa AND Environmental Exposure AND Information Disclosure' on PubMed and 'Sub-Saharan African environmental exposure information disclosure report' on google scholar.

The electronic search yielded 4979 articles, including those found through Google Scholar and a manual search of the reference list of selected articles. A total of 1247 were excluded as duplicates, leaving 3732 articles. After screening, the titles and abstracts of these 3732 articles were scanned, and a total of 3643 articles were excluded according to the exclusion criteria. Therefore, in total, 89 full-text articles were eligible, as shown in Figure 1. Quality assessment of the retrieved articles using the PRISMA guidelines resulted in the exclusion of 40 articles; therefore, 49 studies were included in the final analysis.

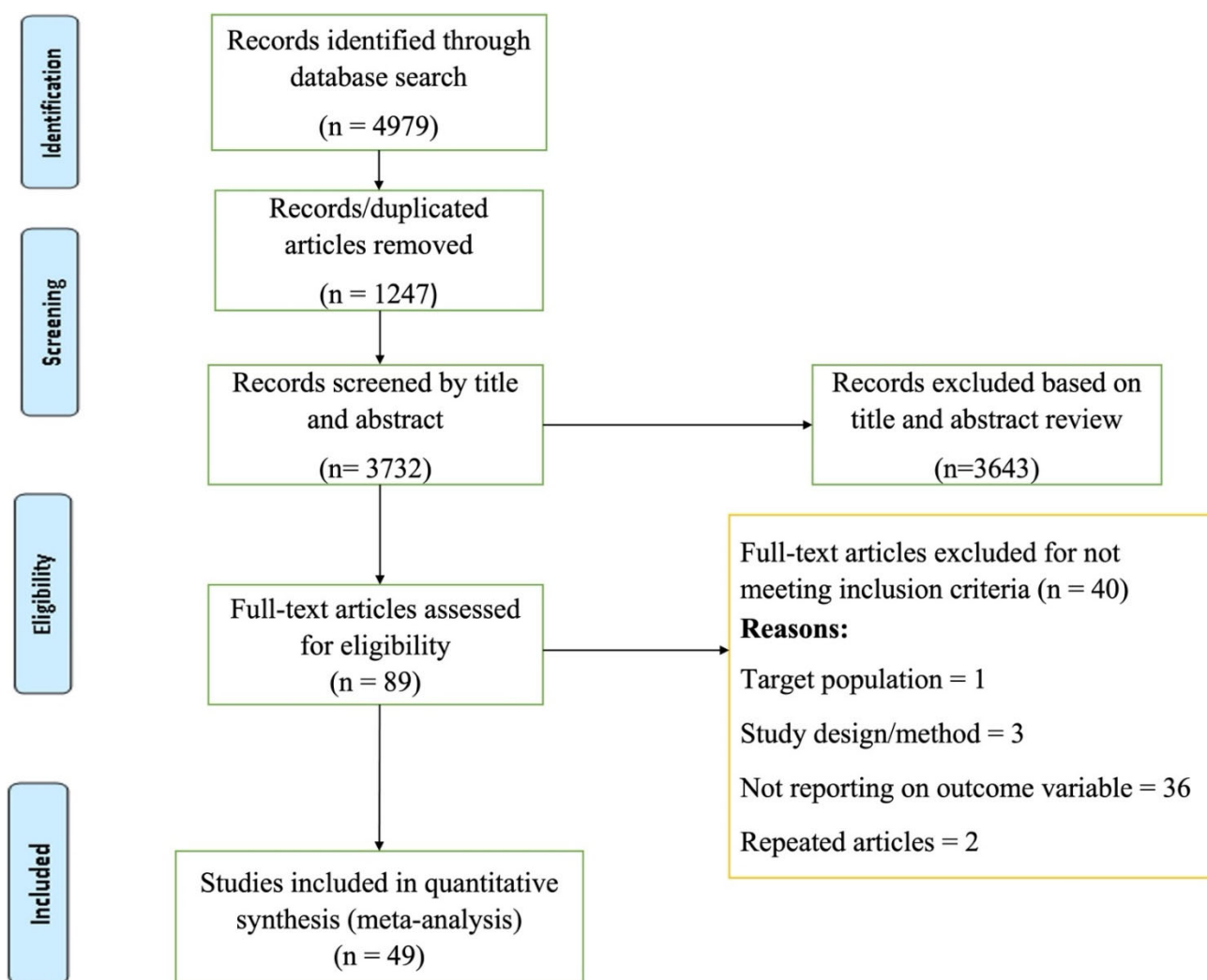


Figure 1. PRISMA flow of studies.

3. Results

3.1. Research Gaps in Environment Information Disclosure in Sub-Saharan Africa

The poor infrastructure in low- and middle-income countries (LMICs) in Africa cause childhood household injuries, and the long-term consequences of these injuries are not well-documented. The information based on these types of injuries is not generally reliable. In Ghana, for example, there are no significant differences in the type and number of these incidents in rural and urban areas. However, the risk factors and various patterns of mechanisms are not evenly distributed (Stewart et al. 2021). The level of environmental disclosure varies by country and is, by international standards, very low in Sub-Saharan Africa. This depends to some extent on the types of companies operating in specific areas and the awareness of the inhabitants of these areas of environmental risk factors (Santamaria et al. 2021). While the disclosure of this information is not effective, the provision of safety equipment, establishing of community creches, and home hazard reduction systems, which should be incorporated with passive injury surveillance systems, is a promising approach to data collection and the development of broader prevention strategies (Stewart et al. 2021).

In terms of the relationship between sustainable development and finance, the IFRS S2 requirements are firmly in compliance with the adoption of FCFD recommendations by companies, which are even better prepared. For instance, climate-related risks and opportunities, indirect adaptation and mitigation efforts, and existing financial resources

with respect to climate resilience are examples of non-disclosures (Baboukardos et al. 2022). Moreover, in the analysis of banking risk data, operational, liquidity, credit, and interest rate risk are crucial elements of financial crises. Therefore, powerful countries such as the United States, the United Kingdom, and China should lead on environmental exposure information disclosure regardless of any losses this incurs (Simona and Rimo 2022). When deciphering the benefits of environmental information disclosure and financial performance, it is necessary to be aware of the effect of business activities and the role these activities play in the environment. The disclosure of information provides improved environmental performance through eco-efficiency and better environmental conditions (Onyebuanyi and Ofoegbu 2022).

Another politically affiliated research gap regarding inadequate environmental disclosure is in the research on the farming landscapes throughout Africa. People are exposed to environmental hazards due to improper landscapes during farming, which results in conflicts among neighboring farmers; the risk and tragedies attached to this form well-documented and disclosed information (Koo et al. 2016). For instance, the information on the damaging effects of the influence of Lake Chad on the hydrologic potential, socio-economics, and eco-sustainability of the drainage systems in Chad and surrounding areas are not well-disclosed to the inhabitants of the region (Onamuti et al. 2017).

A comprehensive environmental health study aiming to shed light on environmental health in Africa from the perspective of the exposome (the totality of human environmental exposures) provides an account of the interplay between human and environmental health (Joubert et al. 2019a). Another specific form of information disclosure involves the lagging facilities in Africa, despite the greater risk to communities and the environment (Franks et al. 2021). The risk of contracting viruses in the environment is related to a combination of socio-economic, climate, biodiversity, and land use. While a country's gross domestic product (GDP) and urbanization are predicted to be associated with human-transmissible viruses and non-vector-borne viruses, biodiversity and the climate are strictly zoonotic-virus-correlated (Zhang et al. 2020). Environmental-exposure-induced infections and complications are not directly reported by the firms or companies responsible; instead, they are recorded by hospitals. The risk of asthma due to environmental smoking exposure, antenatal maternal smoking, and allergies from the consumption of fried meats and fast food is also underdisclosed to people (Levin et al. 2020). There are still gaps in the research on environmental issues that contribute to the cancer burden in Sub-Saharan Africa. With the use of outdated technologies and ineffective environmental exposure information, indoor air pollution, exposure in the agriculture and mining sectors, and the spread of chemical agents due to the mismanagement of hazardous waste from both industrial and local communities are not evaluated, and the information is not well-disclosed (McCormack and Schüz 2012).

Despite the World Health Organization (WHO)'s declaration that the impact of environmental exposure and modifiable environmental factors are major contributors to 20% of the global disease burden, the data on the health outcomes in the African population are not evident or representative (Joubert et al. 2019b). The persistence and 'brown color' of Africa's dust creates specific occupational exposures. These subsequently lead to respiratory, cardiovascular, and other harmful effects through pesticides, metals, and, to some extent, street vendors (Joubert et al. 2019b). Screening tests, health effects, and natural history should all be included in the information regarding proper medical monitoring in public health investigations regarding the potential harm or benefits from exposure. Arguably, Sub-Saharan Africa has not made the decision to limit medical exposure to medically harmful substances, or to move beyond preventive medical efforts while improving overall disability, morbidity, and mortality (Vearrier and Greenberg 2017).

Favorable vegetation improves the lives of inhabitants; however, many African countries, despite the benefits attached to mining, are also challenged by risk and environmental exposure. Most often, on-site surveillance strategies aim to improve conditions, such as acclimatization issues and pre-placement screening related to the environmental exposure

associated with mining. The information disclosed on the cardiovascular (elevated blood pressure, ischemia, and heart failure) and pulmonary effects (subacute mountain sickness, pulmonary hypertension, altitude pulmonary edema, and chronic mountain sickness) of environmental exposure are all underreported. Moreover, neurological effects, ophthalmological, renal, etc., are further mining exposure health issues (Vearrier and Greenberg 2011).

Although under-reported in Sub-Saharan Africa, the effects of noise exposure and secondhand smoke (SHS) exposure on tinnitus incidence in adolescents and young adults has been reported in the United States (Money and Ramkissoon 2020). Moreover, manganese (Mn) neurotoxicity has been found to be associated with parkinsonism, which results in poorer quality of life (QoL) (Dlamini et al. 2020). Another risk posed to the human population, in addition to environmental pollution, is the occupational hazards of seafood, both in land facilities and on-board vessels (Bonlokke et al. 2019). Moreover, cumulative exposure to fumes and silica dust is associated with an increased risk of pneumococcal pneumonia (Torén et al. 2022). Hence, there is a need to eliminate occupational exposures (Sofola et al. 2007).

3.2. Prospects for Sub-Saharan Environmental Exposure Disclosure

It is clear that the time has arrived for Africa to incorporate environmental exposure disclosure into ongoing and future epidemiology studies. This would support multidisciplinary approaches to the design of research projects that involve biospecimen collection and storage, chemical exposure measurements, laboratory strategies, and desirable statistical methodologies. Thus far, Sub-Saharan African nations have not established how genomic factors interact with environmental factors, nutrition, and infection. Once the environmental health exposomic risk factors and genomics are incorporated, analyses are conducted based on the high dimension of the genome and environmental data, and these are bridged, information on the modifiable risk factors could contribute to the design of coherent research on the intervention in and prevention of environmental health exposure in Sub-Saharan Africa. It is apparent that incentives created by public disclosure have a high tendency to significantly reduce pollution in Sub-Saharan Africa. This excerpt is from a study that highlighted the few contributions made by environmental NGOs. In addition, there seems to be no formal channel for public participation in environmental regulation. This boom in the number of environmental non-government organizations (ENGOS) has been shown to affect environmental issues. Despite these serious issues, less effort has been made in different types of ENGO activities.

The underreporting of environmental exposure among the companies listed on the Johannesburg Stock Exchange (JSE) was found to be due to limited data, despite managers' positive attitudes to environmental disclosure. Fear of liability could have been the key reason for this. However, the non-disclosure is partly due to the lack of a legal requirement. There are high hopes that legislative bodies such as the South African Institute of Chartered Accountants (SAICA), with its statement on environmental disclosure as a Generally Accepted Accounting Practice (GAAP), will help to design a number of amendments (de Villiers 2003). Another prospect that is likely to encourage environmental-exposure disclosure is the social, environmental, and economic (SEE) strategy. This has proven to be a positive signal of the legitimacy theory, which will be used to analyze the findings from any formed SEE. Furthermore, economic-strategy-related disclosures are much more robust. This is strongly believed to be due to the focus of financial capital providers on financial performance (Van Zijl et al. 2017).

In developing environmental exposure, research into genetics and genomics attracted a consortium for a meeting on Human Heredity and Health in Africa (H3Africa), and the proposals drawn included changes to evaluate environmental exposures (UNDP 2014). However, genomics research on African descendants has not been sufficiently robust to draw any meaningful conclusions about genetics and the risks of environmental exposure. With a focus on current and emerging chemical and environmental health risk factors for

Africans, as well as the integration of environmental and genomic factors, promising novel mechanisms may lead to environmental exposure and risk disclosure (Joubert et al. 2019b).

The model used to ascertain the risk factors for major external structural birth defects in Kenya is promising. In addition to genetics, sociodemographic–environmental etiology is associated with potential maternal genetic predisposition (Agot et al. 2021). In summary, epigenetic factors require extensive study to rule out some of these episodes. Environmental exposures are not always negative. For instance, improved gut health from the consumption of fermented milk products and reduced involuntary cesarian section are among the protective-factor effects of rural environment exposure to livestock. However, this information is not disclosed, perhaps due to conflicts of interest in commerce (Levin et al. 2020). Although this might seem tentative, using image-sharing social media could lead to a form of environmental exposure information disclosure. Pictures, when properly taken, could disseminate this information to a broader audience (Fung et al. 2020).

Finally, the lack of studies on corporate social environmental disclosure (CSED) means that non-managerial stakeholders' perceptions of the practice cannot be thoroughly examined. Again, in order for a voice to be given to non-managerial stakeholders, CSED accounting regulatory bodies, the participation of the central government, and academia are needed to develop knowledge. With the combination of these forces, policy statements regarding CSED will be issued, and standards could be set for the disclosure of information by various organizations (Uwugbe and Olusanmi 2013).

4. Recommendations

A sound study with a robust output of information is required to provide implications for African policymakers. This would allow them to develop realistic environmental policies, as well as to use information disclosure and environmental regulation tools to coordinate economic and environmental development. Furthermore, a study found that policy has a tendency to reduce the size of industrial firms' exports. While this occurs only in regulated areas, it indicates the presence of pollution and inhibits export-related activities. Therefore, it is critical for policymakers and businesses in Sub-Saharan African countries to consider enterprise development and environmental governance as part of their adopted forward-thinking strategies. This would lessen the negative impact of environmental restrictions on corporate exports once the corporate social and environmental disclosures (CS&ED) of firm economic practices attain sustainable development goals. Implementing CS&ED would be an effective means for chief executive officers (CEOs) and managers to mitigate career concerns.

Since firms are important causes of environmental and economic problems, it is vital that they strengthen their environmental management and information disclosure policies. Therefore, to improve economic and environmental performance, information disclosure is paramount for firms to be open to the public about the impact of their activities on the environment and economy. However, firms doubt whether green activities are profitable and whether it is worthwhile to disclose their environmental information, and there are significant debates on these questions in the literature. To investigate the impact of environmental information disclosure on economic and environmental performance, a reproducible strategy should be employed to identify studies on the impact of environmental information disclosure on firms' economic and environmental performance in Sub-Saharan Africa. The practice of EID by firms tremendously increases their productivity and profitability in terms of exports. Furthermore, a healthier environment (in terms of reduced monoxide emissions) is noticed in cities with strict adherence to EID.

The objective of the mandatory Social and Environmental Standards (SES) adopted by the United Nations Development Program UNDP in 2014 is to strengthen social and environmental outcomes. However, this is only for UNDP projects and does not extend beyond protecting the lives of desperate and poor workers and the inhabitants of affected communities (UNDP 2014). If this were to be applied in Sub-Saharan African nations, the quality of the environment would be improved and the adverse effects on people

would be mitigated or simply prevented. Furthermore, establishing partnerships between UNDP and Sub-Saharan African nations could be a key approach to managing social and environmental risks. Through this, the responses to stakeholders to complaints from project-affected people would ensure full participation and response to the issues (UNDP 2014). If the standards of medical exposure monitoring were based on the Agency for Toxic Substances and Disease Registry and the United States Preventive Services Task Force, the appropriateness of monitoring programs and disclosing the information would be based on scientific criteria. For instance, large-scale, federally funded research efforts by comprehensive health outcome reviews are provided by The World Trade Center Health Program. Furthermore, the characterization of medical exposure based on the severity and the level of risk posed to the population would allow strategies for early detection.

Mining would significantly improve because it directly supports many people's livelihoods. As a result, disclosing the environmental risks it entails would only serve to better prepare the public with preventive measures. For example, South Africa remains at high risk of lead exposure; however, if the exposure levels of lead-containing products such as paint are disclosed, users are better prepared to obtain personal protective equipment, reducing their risk (Mathee 2014). In Sub-Saharan Africa, information based on pesticide resistance to the environment is not properly documented (Chetty-Mhlanga et al. 2018). While the companies that manufacture these insecticides and pesticides have a role to play in informing users about the side effects of their products, users and agencies should also monitor these effects closely to avoid aggravating damage (Matowo et al. 2017). Facility upgrading is one of the methods to reduce environmental exposure. For instance, solar lighting has presented an immediate opportunity to achieve sustained reductions in personal exposure to fine particulate matter (PM_{2.5}) and black carbon (Wallach et al. 2022). PM_{2.5} and BC should be considered in household air pollution intervention packages. Moreover, with stricter air-quality standards, environmental-exposure-related mortality would be checked. For instance, ozone-related mortality was found to be reduced under stricter air-quality standards (Vicedo-Cabrera et al. 2020).

5. Conclusions

This study highlighted some of the research gaps that Sub-Saharan nations need to address in their environmental exposure disclosure plans. These gaps were thoroughly explained, and some protective interventions for Sub-Saharan environmental disclosure were highlighted. Furthermore, the review set some recommendations for further studies. In Sub-Saharan Africa, the environmental exposure information on household injuries, the use of chemicals such as pesticides in farming, industry-linked vectors and diseases, laboratory chemical exposure, industrial exposures, and epigenetic factors are not well-disclosed to the population. When designing policy recommendations, the central governments of Sub-Saharan African nations should set corporate environmental information disclosure standards. These standards should identify heavily polluting industries, and the companies in these industries, for their part, should desist from impression management through the voluntary disclosure of environmental information. Companies should be open enough to reduce their collusion on the control of information on heavy pollution with the media. This review recommended a coordinated relationship between environmental sustainability and government effectiveness. This concerted effort would enhance the application of policies and punishments at the institutional level for violating any form of greenhouse strategy.

However, this review also has some limitations. First, our choice of database may have affected the number of relevant articles. Although we selected two databases (PubMed and Google Scholar), using other databases may increase the number of articles on the research question. Future studies may consider selecting additional databases (e.g., Scopus and Web of Science) for a systematic review in this field. Second, although some criteria were included in the literature search for the literature review, there is still a certain degree of personal subjectivity, which may also be a limitation of this study. Future studies should adopt more objective criteria to examine and organize the literature. Third, a meta-analysis

of the Sub-Saharan African EEID may also be interesting. A meta-analysis may provide a statistical integration of the accumulated research on this topic. Future studies could take this approach further to conduct a complete and comprehensive literature review of ways to solve the EEID for Sub-Saharan Africa.

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Abbreviations

CEO	Chief Executive Officer
CSED	Corporate Social Environmental Disclosure
CS&ED	Corporate Social and Environmental Disclosures
EEID	Environmental Exposure Information Disclosure
ENGOS	Environmental Non-Government Organizations
GAAP	Generally Accepted Accounting Practice
H3Africa	Human Heredity and Health in Africa
LMICs	Low- and Middle-Income Countries
GDP	Gross Domestic Product
JSE	Johannesburg Stock Exchange
WHO	World Health Organization
SAICA	South African Institute of Chartered Accountants
SEE	Social, Environmental, and Economic
SES	Social and Environmental Standards

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