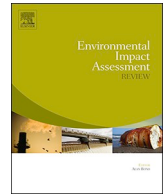




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Health impact assessment and health equity in sub-Saharan Africa: A scoping review



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ABSTRACT

Background: Natural resource extraction projects can have positive but also negative effects on the health of affected communities, governed by demographic, economic, environmental, physical and social changes. Negative effects often prevail and these might widen existing health inequities. Health impact assessment (HIA) is a decision-support tool that aims at maximizing benefits and minimizing negative impacts on people's health. A core value of HIA is equity; yet, little is known about health equity in the frame of HIA, particularly in sub-Saharan Africa.

Methodology: We conducted a scoping review to determine whether and to what extent HIA in sub-Saharan Africa addresses health equity. We included peer-reviewed publications and guidelines pertaining to HIA, environmental impact assessment (EIA) and social impact assessment (SIA). Health equity was investigated by identifying (i) how health considerations were addressed and (ii) whether health was stratified by subgroups of the community.

Results: Out of 1'640 raw hits, we identified 62 articles (16 HIA, 36 EIA, one SIA and nine integrated assessments), 32 of which specifically addressed health. While 20 articles focused on a specific health topic, 12 articles used a more comprehensive approach to address health. In 15 articles there were specific subgroup analyses (e.g. mothers, children or marginalized groups) as a measure of health equity. Another 12 papers referred to the community in a more general way (e.g. affected). Without exception, health was an integral part of the nine included guidelines. HIA guidelines addressed health systematically through environmental health areas, risk assessment matrix or key performance indicators.

Conclusions: We found evidence that previously conducted HIA in sub-Saharan Africa and current guidelines address health equity. However, there is a need to stratify community subgroups more systematically in order to determine health differentials better. Future HIA should consider community heterogeneity in an effort to reduce health inequities by "leaving no one behind", as suggested by the Sustainable Development Goals.

Abbreviations: ACHEIA, Australasian Collaboration for Health Equity Impact Assessment; ADB, Asian Development Bank; AJOL, African Journal Online; ASM, artisanal and small-scale mining; EHIA, environmental health impact assessment; EIA, environmental impact assessment; EIS, Évaluation d'impact sanitaire; ESHIA, environmental, social and health impact assessment; ESIA, environmental social impact assessment; HIA, health impact assessment; HRIA, human rights impact assessment; IAIA, International Association for Impact Assessment; ICMM, International Council on Mining and Metals; IDB, Inter-American Development Bank; IFC, International Finance Corporation; IPIECA, International Petroleum Industry Environmental Conservation Association; LMIC, low- and middle-income country; NGO, non-governmental organization; NREP, natural resource extraction project; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; SDG, Sustainable Development Goal; SDH, social determinants of health; SEIA, social environmental impact assessment; SESA, strategic environmental and social assessment; SIA, social impact assessment; SOPHIA, Society of Practitioners of Health Impact Assessment; UNDP, United Nations Development Programme; UNEP, United Nations Environment Programme; WASH, water, sanitation and hygiene; WHOLIS, World Health Organization Library Information System

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1. Introduction

Natural resource extraction projects (NREPs) in sub-Saharan Africa have the potential to foster economic and social development, and hence, play a role in the current era of the Sustainable Development Goals (SDGs) (UNDP, 2016). Health is explicitly addressed in SDG 3 that is “ensure healthy lives and promote well-being for all at all ages” and closely interlinked with many of the remaining 16 SDGs (Buse and Hawkes, 2015; United Nations, 2015).

NREPs can influence health-related SDGs through proximal and distal causes and pathways. For example, NREPs can directly strengthen health systems and improve people's health through specific disease prevention and health promotion measures (Knoblauch et al., 2014, 2017). Indirectly, NREPs can improve health through changes in people's socio-economic status or by upgrading infrastructure and public services, such as education and access to clean water, sanitation and hygiene (WASH) (Knoblauch et al., 2018; Utzinger, Wyss, Moto, Tanner, and Singer, 2004; Winkler et al., 2012). These examples highlight that NREPs act on the wider determinants of health (Carney and Gushulak, 2016; Dahlgren and Whitehead, 1991).

Potential positive effects of NREPs are opposed by potential adverse impacts (Coelho et al., 2011). For instance, project-induced in-migration, environmental degradation and changing life styles often lead to adverse health outcomes in impacted communities, particularly affecting the most vulnerable groups such as children, women or the elderly (Carney and Gushulak, 2016; Winkler, Krieger, Divall, Singer, and Utzinger, 2012). Taken together, NREPs hold promise, yet might pose challenges for health as a cross-cutting issue in the 2030 Agenda for Sustainable Development.

1.1. Impact assessment

The impact assessment process serves as a decision-support tool for projects, programmes and policies. In the context of NREPs, it aims to minimize negative consequences on the environment, society and public health, while promoting sustainable development (Quigley et al., 2006). Countries worldwide have established the legal requirement that an environmental impact assessment (EIA) must be conducted prior to implementation of a project, programme or policy (Morgan, 2012). In contrast to EIA, only a few countries have established a legal requirement for other forms of impact assessment, such as social impact assessment (SIA), health impact assessment (HIA) and human rights impact assessment (HRIA), which have – at least partially – arisen through discontent with EIA practice (Harris-Roxas et al., 2012; Krieger et al., 2012; Salcito et al., 2015). This holds particularly true for Africa, where not a single country specifically promotes HIA through a policy or regulation, despite health in the context of NREPs being a seminal issue (Erlanger, Krieger, Singer, and Utzinger, 2008; Winkler et al., 2013). HIA is guided by individual, social, environmental and institutional determinants of health with the following five core values: (i) democracy; (ii) equity; (iii) ethical use of evidence; (iv) sustainable development; and (v) comprehensive approach to health (Quigley et al., 2006). These core values emphasize the importance of disclosure and involvement of different stakeholders, including participation of affected communities and reducing inequities (Kemm, Parry, and Palmer, 2004; Krieger et al., 2012). Yet, a considerable gap exists between theory and current best practice (Glucker, Driessen, Kolhoff, and Runhaar, 2013; Harris-Roxas et al., 2012; Morgan, 2012).

1.2. Rationale

Health impacts of NREPs are, beyond physical and environmental changes, closely linked to factors related to the societal structure and public health (Carney and Gushulak, 2016). These factors are known as social determinants of health (SDH), and consist of the conditions in which people are born, grow, live, work and age (Marmot, 2005; WHO,

2017). The uneven – and indeed unfair and unjust – distribution of the SDH leads to differences in health outcomes and, consequently to inequities in health (Marmot, 2005). Hence, the SDH are a root cause of the gap in health equity linked to differential education, socio-economic status and gender among different population subgroups (Marmot, 2005). Focussing on specific population groups, such as the vulnerable, disadvantaged or more specifically the poor, unemployed or illiterate, reflects that a community is not a homogenous structure but rather consists of different subgroups, which are governed by SDH (O'Neill et al., 2014).

Driven by the imperative “to leave no one behind” as of the 2030 Agenda for Sustainable Development, there is a pressing need to improve health and its determinants to achieve the SDGs (Hosseinpoor, Bergen, Schlottheuber, and Boerma, 2018; Watkins, 2014). For this objective, HIA in the context of NREPs should play a central role by mitigating negative impacts and maximizing benefits in order to primarily contribute to SDG3 and thus, to improve health for all at all ages (United Nations, 2015). Moreover, HIA holds promise to promote action for better access to education (SDG4), improving access to clean water and sanitation (SDG6), reducing poverty (SDG1), reducing malnutrition rates (SDG2), improving housing conditions (SDG11), reducing inequality (SDG10) and promoting gender equity (SDG5). Additionally, HIA might aid establishing strong institutions (SDG16) and partnerships (SDG17) by further promoting HIA (Buse and Hawkes, 2015; Quigley et al., 2006; Singer and de Castro, 2007; United Nations, 2015).

While the actions of NREPs on the SDGs were recently mapped by the International Council on Mining and Minerals (ICMM) and the United Nations Development Programme (UNDP) (ICMM, 2018; UNDP, 2016), research about social disparities in health in low- and middle-income countries (LMICs) lags behind (Fullman et al., 2017). Furthermore, tackling the gap in health equity across populations, regions and countries has been a particular challenge for Africa. Indeed, many African countries still face a high burden due to infectious diseases, child and maternal mortality, and malnutrition, while non-communicable diseases and climate change-related health issues are rapidly gaining importance (Agyepong et al., 2017). This gap in health equity, in combination with a “growing appetite” for natural resources in Africa (IEA, 2014), means that promoting HIA is an immediate priority (Winkler et al., 2013).

Despite numerous literature reviews pertaining to specific aspects of HIA, there is a paucity of whether and how HIA has been utilized to address health equity in sub-Saharan Africa (den Broeder et al., 2017; Erlanger, Krieger, Singer, and Utzinger, 2008; Harris-Roxas, Simpson, and Harris, 2004; Hebert, Wendel, Kennedy, and Dannenberg, 2012; Povall, Haigh, Abrahams, and Scott-Samuel, 2014). For instance, three recent reviews pertaining to health and well-being in mining regions were carried out independently of HIA (Brisbois et al., 2018; Loewenson, Hinricher, and Papamichail, 2016; Mactaggart, McDermott, Tynan, and Whittaker, 2018).

The work presented here is guided by the overarching question: “Whether and to what extent is HIA utilized to address health equity in the context of NREP in sub-Saharan Africa?” More specifically, by means of a scoping review, we aimed to evaluate how the health of different population groups is integrated in impact assessment for NREPs in sub-Saharan Africa.

2. Methodology

2.1. Scoping review

A scoping review was conducted targeting both, peer-reviewed literature about and guidelines for impact assessment. The methodology was inspired by two recent literature reviews (den Broeder et al., 2017; Pereira et al., 2017).

The term “natural resource extraction project” is hereafter used to

refer to different kinds of development projects, including project from the mining, minerals, oil and gas, timber, and biofuel sectors, as well as other infrastructure projects such as hydro dams and other power plants. Of note, artisanal and small-scale mining (ASM) was not considered in the current scoping review.

While the focus of our research was on HIA, other forms of impact assessment, specifically EIA and SIA, were also considered in order to get the full spectrum of health in impact assessment. Henceforth, the broad term “impact assessment” was employed to refer to the three main types of impact assessment (EIA, HIA and SIA) as well as integrated approaches, such as environmental, social and health impact assessment (ESHIA), environmental health impact assessment (EHIA), environmental social impact assessment (ESIA) and social environmental impact assessment (SEIA).

2.2. Peer-reviewed literature

We conducted a systematic search guided by the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses” (PRISMA) statement (Moher et al., 2009). The search terminology was developed as an iterative process and consisted of three search term blocks: (i) sub-Saharan African countries; (ii) NREPs; and (iii) impact assessments. The search strategy was applied in PubMed, Scopus and the African Journal Online (AJOL) with search terms amended to the specific features of the databases. There was no language restriction, while temporally, the search was restricted from January 1, 1998 to December 31, 2018. Details of the search strategy are available in a supplementary file (Appendix A1).

All records were independently screened by two of the authors using EndNote version X7.9 for data management (Thomson Reuters Corp.; New York City, NY, USA). Discrepancies were discussed among the two authors and, if needed with a third author until consensus was reached.

Research articles (of note, conference proceedings and books were excluded) were considered as eligible if they were: (i) accessible with the rights of the University of Basel; (ii) pertained to a country, project or region in sub-Saharan Africa; (iii) focussed on NREP; and (iv) related to an official EIA, HIA, SIA or integrated impact assessment. For instance, studies about life cycle assessment were excluded for the current scoping review. Additionally, citations from all relevant publications were screened for additional studies.

The included studies were analysed based on a qualitative thematic analysis, as described by Levac, Colquhoun, and O'Brien (2010). In short, background data (i.e. author, year of publication, affiliation, type of impact assessment, project country and natural resource extracted/ type of infrastructure project) were extracted based on full-text analysis and entered into an Excel spread sheet (Microsoft Excel 2010, Microsoft Corp.; Redmond, WA, USA). Additionally, data about the study purpose were extracted.

A two-step procedure was applied for the analysis from a health equity perspective. First, data about how health was addressed in all identified studies were extracted. Second, the “health-integrating studies” were analysed about how the community and its subgroups were considered (O'Neill et al., 2014). Extracted text segments were coded for relevant themes (i.e. study purpose, health, population groups addressed and level of engagement) and deriving codes were assigned to all studies where applicable.

2.3. Guidelines

Complementary to the peer-reviewed literature, international guidelines for EIA, HIA and SIA and national guidelines for HIA from sub-Saharan African countries were systematically searched. As detailed in the supplementary file (Appendix A2), HIA guidelines were searched in Google (in English, French and Portuguese), the “Grey

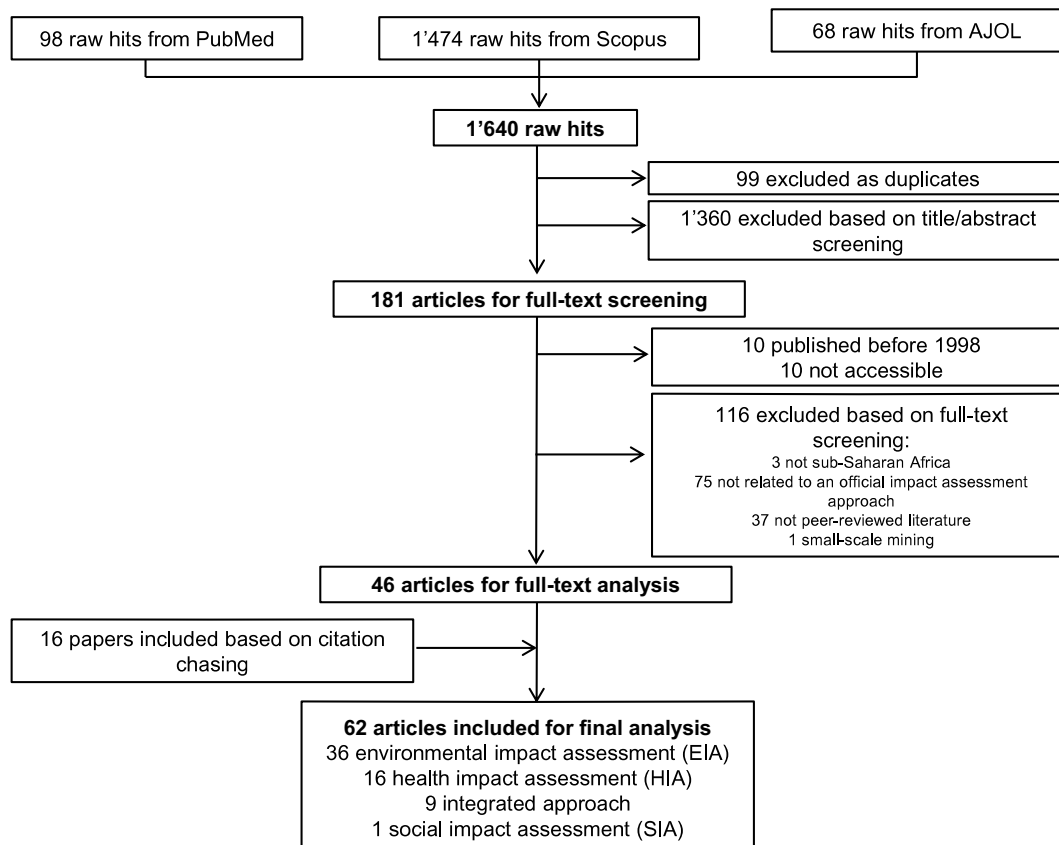


Fig. 1. PRISMA flowchart showing the selection process of the peer-reviewed literature (AJOL: African Journal Online).

Literature Report” database, the Guidelines International Network and the World Health Organization Library Database (WHOLIS) by combining search terms for HIA and guidelines (e.g. “assessing impact*” or “guide”) and – if applicable – the countries of sub-Saharan Africa. This initial search for HIA guidelines was complemented by a hand search for EIA and SIA guidelines. Publications provided by the International Association for Impact Assessment (IAIA) were used as starting point (i.e. fast tips, international best practice principles and key citations). Additionally, all impact assessment guidelines referenced in the retrieved studies were extracted and systematically searched. The guidelines were reviewed by a single assessor and consolidated by an experienced HIA researcher and practitioner, who is broadly networked with HIA experts in different parts of the world.

Based on full-text screening, guidelines from the past 20 years were considered as eligible if they were: (i) available online; (ii) containing an introduction about the concept of EIA, HIA or SIA; and (iii) providing methodological guidance to conduct EIA, HIA or SIA. As the current research is focused on HIA for NREPs in sub-Saharan Africa, national impact assessment guidelines for specific programmes or policies in high-income countries were excluded.

The following data were extracted and entered into an Excel spreadsheet based on full-text analysis: institution/publisher, year, title, consortium, steps/process, health definition, health determinants addressed, suggested tools, indicators for measurement, population groups addressed and the intended level of stakeholder engagement or community participation.

3. Results

3.1. Peer-reviewed literature

As shown in Fig. 1, 62 articles out of 1’640 raw hits met our inclusion criteria, of which 36 were related to EIA, 16 to HIA, one to SIA and the remaining nine to integrated approaches (four ESHIA, three ESIA, one SEIA and one SIA in EIA). The retrieved articles pertained to studies carried out in 16 countries of sub-Saharan Africa (Fig. 2). Nigeria and South Africa were the two countries with the largest number of studies; nine in each of them. Of note, 10 studies included more than one country in sub-Saharan Africa. The studies included a host of extractive industries or infrastructure projects, including mining ($n = 20$), oil and gas ($n = 11$), hydro dams ($n = 9$), biofuel projects ($n = 3$) and timber ($n = 1$). Moreover, 18 studies pertained more generally to development projects. Of note, when impact assessments were conducted for a specific sector or project, often more than one paper was published, such as for the oil and gas sector in Nigeria ($n = 4$) and the Chad-Cameroon petroleum development and pipeline project ($n = 3$). A summary of the 62 studies retrieved is given as supplementary file (Appendix A3).

Based on the extracted data, the studies were classified into two main groups and three subgroups, as summarized in Fig. 3. Sixteen studies belonged to the first main group, characterized by impact assessment applied either simultaneously or prospectively of a project development, and hence, we considered them as case studies. These case studies can be further subdivided into (i) full impact assessment

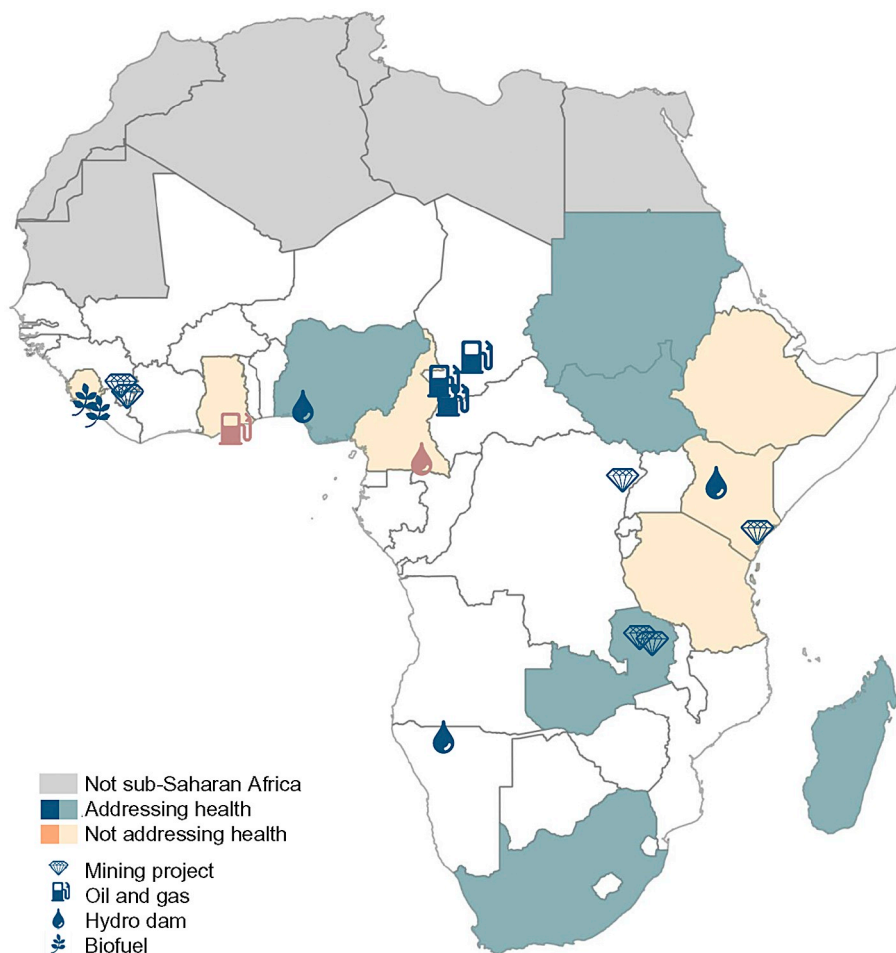


Fig. 2. Geographic distribution of included studies addressing health (blue) and issues other than health (orange): icons indicating type and location of case studies; countries are coloured if there was at least one published study about the evaluation of impact assessment in the given country. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

studies ($n = 4$); (ii) focused impact assessment studies ($n = 7$); and (iii) methodological impact assessment studies ($n = 5$).

The remaining 46 studies were tagged as impact assessment evaluation studies, as they were carried out mainly retrospectively, either at the local, national or international level. These evaluation studies can be further differentiated into (i) evaluation of effectiveness or quality appraisal of impact assessment ($n = 20$); (ii) evaluation of the institutionalization or national legislation of impact assessment ($n = 19$); and (iii) methodological contributions ($n = 7$). Further specificity for the different groups and subgroups are provided in Fig. 3.

Regarding study purposes, stratified by the different types of impact assessment, more than half of the case studies were related to HIA (9 of 16; 56%). As regards the second main group of the evaluation studies, most of them pertained to effectiveness and institutionalization/legislation subgroup, and hence, were related to EIA (12 of 19; 63%). However, in the third subgroup of methodological contributions, HIA played an important role (3 of 7; 43%).

As shown in Fig. 4, health was addressed in 32 of the 62 studies identified through our scoping review (52%), revealing two different approaches. Among all health-integrating studies, 20 had an overarching thematic orientation of health, such as health monitoring ($n = 5$), environmental health ($n = 4$), public health ($n = 4$), health impacts ($n = 3$), health promotion ($n = 3$) and health care services ($n = 1$). The remaining 12 health-integrating studies covered multiple of these categories and employed an even more comprehensive definition of health. With regard to case studies ($n = 16$), all, except two of five EIA related case studies, addressed health.

Within all health-integrating studies, reporting about communities was categorized in four subtypes, as shown in Fig. 5. Almost half of the studies ($n = 15$) stratified the communities into subgroups, mentioning them explicitly (e.g. mothers, children and workers). Twelve studies reported about communities in a more general fashion and thus, did not refer to specific subgroups of the populations, with the exception of terms such as vulnerable or affected. A few studies focused on specific subgroups (women, mothers and children) throughout the entire study ($n = 3$) or did not mention the community specifically ($n = 2$).

3.2. Guidelines

Overall, 17 impact assessment guidelines met our inclusion criteria, and hence, were subjected to full-text screening (eight HIA, five SIA, two EIA, one EHIA and one strategic environmental and social assessment (SESA)). However, eight of these guidelines were excluded after full-text analysis, because they provided insufficient methodological guidance on impact assessment ($n = 5$) (Loayza and Albarracin-Jordan, 2010; Mahoney, Simpson, Harris, Aldrich, and Stewart Williams, 2004; Quigley et al., 2006; Senécal, Goldsmith, Conover, Sadler, and Brown, 1999; Vanclay, 2003), were not specifically about impact assessment ($n = 1$) (Macdonald and Schloeffel, 2014) or focused on the Australian continent ($n = 2$) (enHealth, 2017; Franks, 2012). Hence, nine guidelines (five HIA, two SIA, one EHIA and one EIA) were included in the final analysis (see Appendix A4). In cases where more than one version was available from the same publisher, the latest version was considered.

The nine guidelines were published by international health, environmental, financial or industrial institutions or national health departments. All of them were written or reviewed by an international committee with considerable impact assessment expertise. While seven guidelines were written for development projects in general or various kinds of NREPs, the HIA guidelines published by ICMM and the International Petroleum Industry Environmental Conservation Association (IPIECA) were sector-specific for mining or the oil and gas sectors, respectively (ICMM, 2010; IPIECA, 2016). In addition to the international guidelines, only one national guideline for EHIA was included, published by the South African Department of Health (2010). Of note, the HIA and EIA guidelines were all based on common processes (consisting of screening, scoping, assessment, recommendation, reporting, monitoring and evaluation phase), while the processes for SIA were based on different phases or elements.

Health was – beyond the HIA and EHIA guidelines – also addressed in the included EIA and SIA guidelines. The environmental determinants of health (e.g. air, soil and water pollution) were used in the EIA and EHIA guidelines (Abaza, Bisset, and Sadler, 2004; South Africa, 2010). The EHIA guidelines from South Africa aim to integrate health systematically into the national EIA process. The SIA guidelines

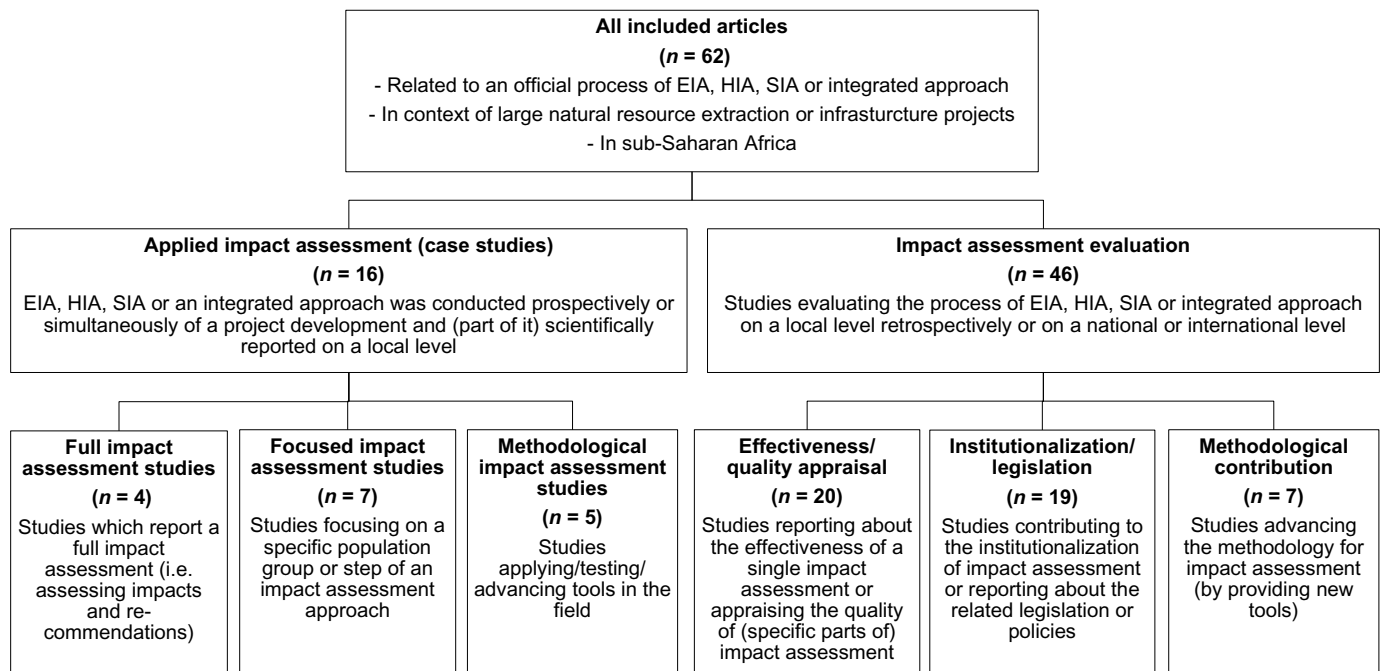


Fig. 3. Overview of main- and subgroups of the study purposes of all included studies revealed by the qualitative thematic analysis.

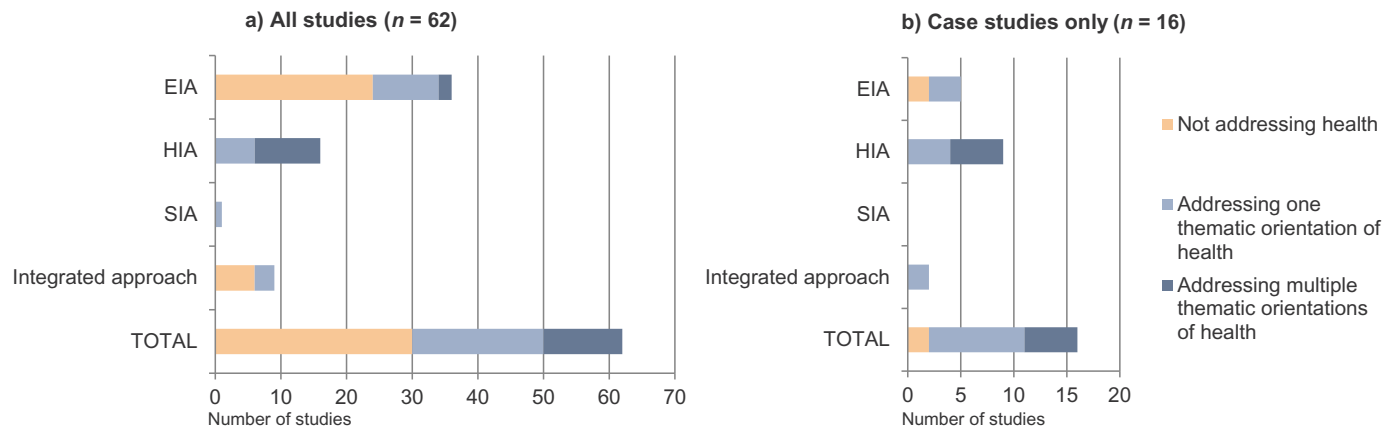


Fig. 4. Number of studies not addressing health (orange), addressing one thematic orientation of health (light blue) or multiple thematic orientations (blue), stratified by type of impact assessment (EIA, environmental impact assessment; HIA, health impact assessment; SIA, social impact assessment; integrated approach, combination of specific impact assessments) and in total. The results are presented for a) all included studies ($n = 62$) and b) the case studies only (i.e. impact assessments conducted prospectively or simultaneously to the project development, $n = 16$). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

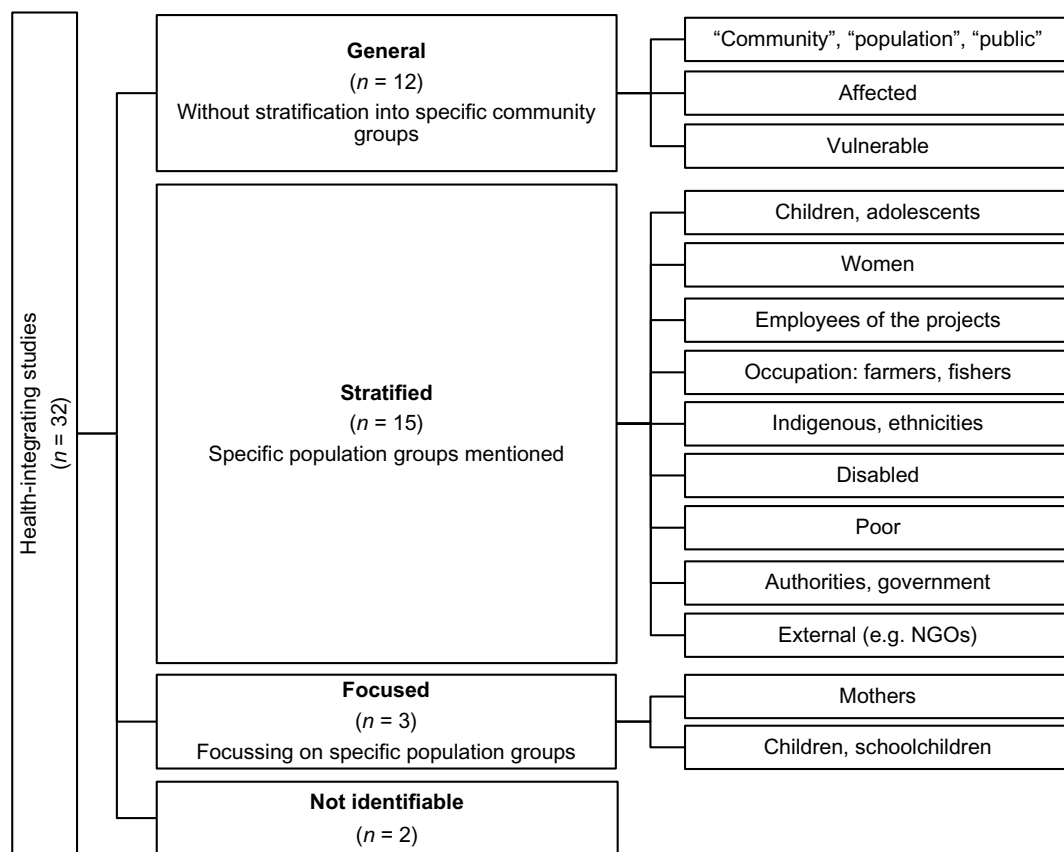


Fig. 5. Categories (and their definitions) used by health-integrating studies to stratify communities into subgroups derived by qualitative thematic analysis (NGO: non-governmental organization).

addressed health comprehensively as a cross-cutting issue between social and environmental impacts (Kvam, 2018) or even as social impact per se (Vanclay, Esteves, Aucamp, and Franks, 2015). In all HIA guidelines, health was addressed comprehensively by drawing on different wider determinants of health, including environmental, social, institutional, modifiable or contextual determinants (ADB, 2018; Bhatia et al., 2014; ICMM, 2010; IFC, 2009a; IPIECA, 2016). By the introduction of environmental health areas, risk assessment matrix and key performance indicators, the International Finance Corporation

(IFC), IPIECA and to some extent the ICMM guidelines for HIA, offered a particularly systematic methodology to address health, assess health impacts and monitor the health of communities over time.

All guidelines emphasized the need to include particularly vulnerable population groups, but at different levels. Specific social groups (e.g. women, elderly and the poor) were named in the EIA guidelines. The social gradient among communities was emphasized by the Asian Development Bank (ADB). Considering different “potentially affected communities”, based on the geographic distance between the

communities and the affected project area, was suggested by the IFC and IPIECA guidelines for HIA. A separate profiling step to disentangle the community into different population groups was introduced in the ICMM and ADB guidelines for HIA. Attention was drawn to the heterogeneity of the population throughout the entire process in the SIA guidelines. However, no concrete tool for profiling the community based on socio-economic background was given in any of the guidelines scrutinized in the current scoping review. Besides addressing the community, the level of public participation ranged from involvement and consultation in EIA guidelines, democracy as a core value in HIA guidelines up to empowerment of the community in the SIA guidelines. Taken together, equity in health in NREPs in sub-Saharan-Africa is addressed in existing HIA and SIA guidelines examined here.

3.3. Guidelines referred to in the peer-reviewed literature

The identified articles in the peer-reviewed literature referred to five different types of guidance documents for impact assessment. First, environmental national regulations and associated guidance documents such as ‘Environmental Management and Coordination Act’ (Kenya), ‘Environmental Impact Assessment Procedural Guidelines’ (Nigeria), ‘Environmental Protection Agency Act’ (Sierra Leone) and ‘Environmental Conservation Act’ (South Africa) were referenced. Second, international guidance documents about specific topics such as in-migration were referenced (IFC, 2009b). Third, international conventions such as the Aarhus convention (UNEP for Europe, 1998), the Gothenburg consensus paper (WHO, 1999) and the Equator Principles (The Equator Principles Association, 2011) were also referenced, including performance standards on environmental and social sustainability by IFC (in particular performance standard #4 about community health, safety and security and performance standard #5 about land acquisition and involuntary resettlement) (IFC, 2012). Fourth, several text books about HIA and EIA were referenced (e.g. Birley, 1995; British Medical Association, 1999). Fifth, guidance documents referenced for HIA specifically included the ICMM, IFC, IPIECA and the Society of Practitioners of Health Impact Assessment (SOPHIA) guidelines, as well as the IAIA best practice principles (Quigley et al., 2006). Overall, the IFC guideline was a major resource for different researchers not only with the various types of publications they provide (HIA guidelines and topical best practice handbooks) but also as an international regulating body of the projects with its performance standards and the associated guidance notes.

4. Discussion

The potential impacts that NREPs have on people's health and well-being, which should be predicted and managed by prospective HIA, are linked not only to physical and environmental changes but also to societal factors (Carney and Gushulak, 2016). Indeed, unequal distributions of SDH can lead to health disparities between countries and within communities in a given setting. The current scoping review provides evidence that HIA in sub-Saharan Africa, which is mainly researched and regulated on an international level, holds promise for monitoring and potentially reducing health disparities.

4.1. HIA and health in impact assessment in sub-Saharan Africa

Our scoping review identified 62 studies. Interestingly, only one study related to SIA, which might be explained by various trends within SIA (e.g. human rights or social performance) as well as a more practical rather than publishing oriented community (Esteves, Franks, and Vanclay, 2012). Most studies included in the current review criticized the effectiveness or the legislation of the EIA process, whereas HIA studies were mostly case studies about prospective impact assessments and methodological contributions. Our findings are consistent with previous papers emphasizing that HIA is, compared to EIA, a relatively

recent approach and remains to be institutionalized in sub-Saharan African countries (Erlanger, Krieger, Singer, and Utzinger, 2008; Winkler et al., 2013). Nevertheless, compared to several retrospective EIA studies, many HIA studies included in the current review were conducted prospectively or simultaneously to the project development, and henceforth more likely to inform decisions to safeguard health of the affected populations.

In addition to the peer-reviewed literature, nine guidelines on impact assessment met our inclusion criteria, of which five were HIA guidelines. For EIA, only one international guideline was identified (Abaza, Bisset, and Sadler, 2004), while the peer-reviewed literature mostly referred to national documents related to EIA. Hence, our findings demonstrate that EIA in sub-Saharan Africa is mostly regulated and legally required at the national level (Morgan, 2012). With regard to HIA, South Africa is the only country in sub-Saharan Africa with publically available guidelines, aiming to include health systematically into the national EIA process (South Africa, 2010). Taken together, HIA in sub-Saharan Africa is – compared to EIA – mostly researched, promoted and regulated by an international community consisting of researchers, practitioners, financial and private organizations aiming to improve health and well-being of people affected by the extraction of natural resources.

4.2. HIA to address health equity in sub-Saharan Africa

In the current scoping review, we found evidence that health was addressed in about half of the studies identified and about one third of all studies considered different population subgroups, which we considered as a proxy for measuring equity. Beyond health and addressing different subgroups of the community, another crucial factor for equity in impact assessment is public participation, which is considered as key feature of HIA (Kemmm, Parry, and Palmer, 2004; Quigley et al., 2006; Utzinger, Wyss, Moto, Tanner, and Singer, 2004). However, several studies included in our review reported about the ineffectiveness of EIA in sub-Saharan Africa due to the lack of public participation (Bawole, 2013; Okello, Beevers, Douven, and Leentvaar, 2009; Ridl and Couzens, 2010). Moreover, some authors referred to EIA as compliance-oriented approach or check-box exercise (Morgan, 2012). The challenge of public participation in HIA and the lack of a coherent methodology for participation in HIA has been stressed by different researchers in regions where HIA is more advanced as compared to Africa (den Broeder et al., 2017; Heller et al., 2014; McCallum, Ollson, and Stefanovic, 2015). Of note, the heterogeneity of a community as well as the empowerment of the impacted community was highlighted in SIA guidelines included in our piece (Kvam, 2018; Vanclay, Esteves, Aucamp, and Franks, 2015). Hence, for the further promotion of HIA towards institutionalization in sub-Saharan Africa, and to ensure a participatory and community-based process, lessons learned from EIA and experiences from world regions other than Africa will be important. In this regard, the SIA guidelines could be used as source for inspiration.

While previous HIA studies conducted in Australia and Canada (Harris-Roxas, Simpson, and Harris, 2004; Povall, Haigh, Abrahams, and Scott-Samuel, 2014), along with a specific equity-focused framework for HIA published by the Australasian Collaboration for Health Equity Impact Assessment (ACHEIA) (Mahoney, Simpson, Harris, Aldrich, and Stewart Williams, 2004), demonstrate the potential of HIA to address health inequalities, this has not yet been reported for sub-Saharan Africa. By triangulating the analysis of the HIA peer-reviewed literature and guidelines included in our review, we found evidence that HIA for NREPs in sub-Saharan Africa is underpinned by a consistent and field approved methodology across different guidelines, including equity as a core value. The environmental health areas approach embraces health topics systematically and identified health impacts are weighted by means of a risk assessment matrix. This finally allows for monitoring key performance indicators (ICMM, 2010; IPIECA, 2016; Winkler et al., 2010, 2012). Furthermore, it is suggested

to identify “potentially affected communities” within the larger project area (IFC, 2009a; IPIECA, 2016; Winkler et al., 2011). Yet, although a specific profiling step is introduced in the ICMM guidelines (ICMM, 2010), an advanced methodology to stratify the community into subgroups – moving beyond geographical classification to take into account the wider determinants of health – is still missing. This is reflected by the strong variation in the approach to identify health impacts among sub-categories of the community in the identified studies of this review. As suggested by Povall, Haigh, Abrahams, and Scott-Samuel (2014), a qualitative participatory data collection tool to assess health impacts differentially and to generate evidence for differential recommendations with the overarching objective to improve HIA for health equity.

Nevertheless, some positive effects of interventions sponsored by extractive industries on the health of particularly vulnerable groups are reported in relation to HIA (Knoblauch et al., 2014, 2017). Consequently, we consider HIA as a promising approach to contribute to narrowing the health equity gap in settings where NREPs are being implemented in sub-Saharan Africa and elsewhere. This requires new research about community stratification and participation in HIA, while placing particular emphasis on prospectively conducting HIA for communities, extractive industries and local health systems, beyond single case studies. In addition, HIA practitioners should work with policy experts to ensure that research findings are translated into specific policy recommendations to improve population health.

4.3. Limitations

Our scoping review has several limitations that are offered for discussion. First, we focused on large NREPs, while the economically important informal sector of natural resource extraction (i.e. ASM), which might have negative impacts on the health of miners and surrounding populations, were not considered (Gibb and O’Leary, 2014). This is explained by the fact that ASM is, in most cases, an informal economic activity and, thus, the application of impact assessments prior to the establishment of ASM is not a standardized practice. Second, we only included studies published in the peer-reviewed literature, while studies reported in the grey literature were not reviewed. Additionally, databases with an emphasis on social sciences could have complemented our electronic searches for the peer-reviewed literature. Third, our search strategy was not specified for the nationalities of the sub-Saharan African countries (e.g. Angola*/Angolan, Benin*/Beninese, Botswana*/Botswanan, etc.). Forth, in addition to international guidelines, national regulations or legislation particularly for EIA might have served as complementary data sources. Despite these limitations, it should be noted that previous reviews pertaining to HIA employed similar methodologies (Erlanger, Krieger, Singer, and Utzinger, 2008; Hebert, Wendel, Kennedy, and Dannenberg, 2012; Pereira et al., 2017).

5. Conclusion

The potential impacts of NREPs on people’s health and well-being are largely determined by social factors beyond physical and environmental changes. These social factors, and how they are shaped by NREPs, should be measured and managed by prospective HIA, which ideally also includes differential recommendations to address the needs of different population groups adequately. Although HIA has yet to be institutionalized in most parts of sub-Saharan Africa, we found evidence that HIA is underpinned by a systematic and field-approved methodology. Moreover, there are first reports about positive effects on the health of vulnerable population groups in context where rigorous HIA was commissioned by extractive industries. In view of the strengths of rigorously conducted HIA, which might improve health equity, we recommend inclusion of a qualitative data collection step during profiling, in order to stratify the community into subgroups, address health differentials adequately and most importantly “to leave no one behind”,

as suggested by the 2030 Agenda for Sustainable Development. HIA and the accompanying methods for research pertaining to HIA should be further promoted in different sectors engaged in natural resource extraction in sub-Saharan Africa to improve the health of differently affected population groups and to act towards health equity.

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Conflict of interest

The authors declare that they have no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.eiar.2019.106288>.

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