



ABSTRACT

Planetary health argues that urban and natural environment and health are indivisibly linked, in this regard, a growing number of emerging interdisciplinary and transdisciplinary approaches, under the auspice of planetary health, have been developed to focus on addressing sustainable development goals numbers 3.9 and 11.3. This is a systematic

REVIEW OF DISCIPLINARY CONTRIBUTIONS TO PLANETARY HEALTH COLLABORATIONS FOCUSED ON SUSTAINABLE URBAN DEVELOPMENT: AN INTEGRATED APPROACH TO SUSTAINABLE DEVELOPMENT GOALS 3.9 & 11.3

***UMAR IBRAHIM; & **JASON H. PRIOR**

**Community Medicine Department, College of Medicine, Federal University Dutse, Jigawa State, Nigeria. **Institute for Sustainable Futures, University of Technology Sydney, Australia, PO Box 123, Sydney, NSW 2007, Australia*

Introduction

Planetary health argues that the urban and natural environment and health are indivisibly linked, and it has been suggested that inter and transdisciplinary approaches focused on addressing the sustainable development goals are needed to address their complex interdependences [1, 2]. Planetary health as a field of scientific inquiry focuses on addressing the challenges posed by environmental changes on human health [1], and the state of natural systems, through the application of transdisciplinary thinking [2, 3]. Impact of urbanization on health is a significant issue [4], with mixed features, thus, the health risk in one hand, and its mitigation on the other [3, 5].



Environmental hazards with potential effect on urban health includes floods, erosion and tidal surge [6-8] and air pollution among others, as a result of domestic and industrial biomass released, and they increased the risk of pulmonary diseases like pneumonia [5, 9]. Management of the highlighted issues is a process that involve several stakeholders through interdisciplinary and/or transdisciplinary collaborations [6, 10, 11].

Recently, both inter and transdisciplinary approaches are applied in research and learning, due to the fact that disciplinary specialization creates exclusion,

literature review of transdisciplinary approaches to planetary health focused on addressing SDG 3.9 and 11.3. A systematic literature review search was conducted in five databases and Google Scholar from April 4th to 30th May 2018, applying inclusion and exclusion criteria. The search uncovered 232 articles from which 57 relevant articles were selected and synthesised for the study. The findings of the review reveals potential disciplinary contributions across the environment, health governance, ecological public health, health geographies, global health governance, and sustainable development that could theoretically address planetary health challenges, through transdisciplinary collaborations. Furthermore, the findings highlight how transdisciplinary collaborations for planetary health drawn attention across different levels of decision-making could benefit from the disciplinary contributions. Addressing planetary health requires methodological approaches and coordinated actions that mitigate environmental change impact on human health from the targeted disciplines, through an effective environment and health governance mechanism, at both local and international levels, utilizing Sustainable Development Goal 3.9 & 11.3 stipulations.

Keywords: Systematic-review, Planetary-Health, transdisciplinary, Sustainability, Urbanization



division and isolation in the context of increased contemporary multi, inter, and transdisciplinary adoption to research and learning [12]. Interdisciplinary in this review means a collaboration across disciplinary silos, for research and/practices, beyond mono traditional problem solving approaches [13, 14]. While, transdisciplinary denotes a collaboration and integration between different organisations and disciplines, for a relationship that strengthen research and practices [13, 15, 16]. Both inter and transdisciplinary terms refers to a collaboration between persons from different perspectives, thus public/private/non-state sectors, academic disciplines, corporate bodies, scientific and non-scientific communities [13, 14, 16, 17]. Therefore, the responsibility of achieving cross disciplinary collaborations lies on the stakeholders and implementation of policies that facilitates contributions from multiple actors [15].

Transdisciplinary collaborations for planetary health links Sustainable Development Goals' (SDGs) relevant indicators, to human health and environment [2, 18, 19]. This was based on the premise that ideal sustainable urban development needs approaches that considers the connections between environmental changes and human health [20-22], and their interdependence [23]. As such, judicious combination of goal 3.9 and 11.3 indicators could support and enhance urban health. Approach to realising sustainable urban health is environmental governance in collaborations among academics, public, private and civil society sectors, with stake in health and environment [24], to shape the urban health landscape, for sustainable urban development.

Overall, there is a need to understand that planetary health complexity and multiplicity, makes their management by traditional disciplines in silos, challenging [25, 26]. As such, addressing it will benefit from disciplinary contributions, actions [4, 26-28] and interdependency [23, 29]. Through this suggestions, a growing number of interdisciplinary and transdisciplinary approaches, for planetary health have been developed to address sustainable development goals numbers 3.9 and 11.3.

The literature review search was exclusively systematic and involved narrative synthesis [30]. Narrative synthesis is relevant in a situation where a statistical approach is not considered, and combination of



findings from multiple studies, focusing on a wide range of question is adopted [31]. Against this background, the review explores the theoretical contributions that mitigates the impact of environmental changes on human health, concentrating on transdisciplinary collaborations, drawn from the experience of academic disciplines with stake in environment and health. Therefore based on the available evidences, the review answer the following questions: What is environment and health governance? What are the potential contributions of ecological public health, health geographies, global health governance and sustainable development discourse in mitigating the impact of environmental change on human health through SDGs 3 & 11viewpoint?

Methodology

Search strategy

The conduct of the literature search started from April 11th to 30th May 2018, through PubMed, Web of Science (all databases), Science direct, ProQuest (environmental) and EMBASE databases. Which the following were used as search terms under this section, based on their potentials to planetary health disciplinary contributions; the search aimed at relevant literature that address the question raised thus environment, health, and governance as an entity. To achieve the feat, combination of search keywords were used; thus Health governance, Environmental governance, Health governance AND environmental governance; Ecological public health, Global health Governance, Health geographies and Environmental Governance, Health geographies and Health Governance, Sustainability, Sustainable Development, Environment and SDGs, Sustainable Development Goals (SDGs), SDG 3, SDG 11, trans-discipline and transdisciplinary collaborations (See Table 1):

Table 1: Search technique & articles selection

Theme	Search words	Returned	Narrowed	Selected
Environment, Health and Governance	Environmental & Health Governance	469	16	5



Environmental Governance	2,485	33	6
Health Governance & Environmental Governance	55,528	8	0
Health Governance	305	21	6
Global Health Governance	257	34	3
Ecological Public Health	34	31	13
Health Geographies	417	23	5
Sustainable Development	58,199	19	6
SDGs	797	16	2
Environment & SDGs	2,325	5	4
Health & SDGs	85	5	1
SDG 3	9	12	2
SDG 11	20	9	4
Total	120,930	232	57

Inclusion and exclusion criteria

The inclusion criteria utilized were as follows:

- Articles published on the 1st January 2008 to 30th May 2018, except for two articles, which were considered base on their relevance to the topic under study.
- Only articles published in English language.
- Peer reviewed articles were the initial choice for inclusion. However, other types of articles like editorials, commentaries and special publication related to the topic in contention are included.
 - The considered articles were exclusively on Environment, Health and Governance

Study Selection

The selected literature have at least address environment or health governance issue in the context of planetary health and sustainable



development. The literature was sort based on the highlighted issues; as such, the study was not exhaustive but selective.

Data extraction

At the end of the search 57 articles (papers) meet the inclusion criteria (see Table 1). The process of the review begun by removal of duplicate articles, then abstracts and conclusions were checked and review for inclusion. All of the selected documents addressed health and environment issues from the disciplinary perspective. Although, there exist slight differences in their approach, but their contributions are distinct and interconnected, suggestive of the needed collaborations that could enhance planetary health. Table 2 summarises the search results.

Findings

The selection of paper is presented in Table 1. Overall 57 articles were selected after categorical search on the topic under study: The following breakdown emerged, thus; environmental governance (N = 11), Health governance (N = 6), Global health governance (N = 3), Ecological public health (N = 13), Health geographies (N = 5), Sustainable development (N = 6), SDGs (N = 2), Environment and SDGs (N = 4), Health and SDGs (N = 1), SDG 3 (N = 2), and SDG 11 (N = 4). Table 2 present a summary of disciplinary contribution for each of the topics under study.

Charateristics of the study

As revealed in table 1 and 2 most of the 57 articles reviewed explored the theoretical focus of the disciplines under study, so as to understand how they deal with environment and health issues as one, in their perspective. The review outcome could guide the theorising of how disciplinary contributions can address planetary health challenges. Specifically, academic articles that make reference to 'planetary health collaborations' in the lens of 'SDG goal number 3.9' and/or 'SDG goal number 11.3' were examined. The key finding here suggest that most of the disciplinary contributions can be used to conceptualised theories for the emerging 'planetary health collaborations'.



In this regard, disciplinary contributions of environment governance, health governance, global health, ecological public health, health geographies, and sustainable development as disciplines with stake in mitigating the impact of environmental changes on human health were explored and highlights below.

Disciplinary (multi/inter/trans) Collaborations

Five of the articles provide understanding of disciplinary collaborations. Disciplinary collaboration means a collaboration across traditional disciplinary boundaries, like academics (researchers), non-academic (managers, planners & local communities), and organizations (public, private and non-state sectors) [13, 14, 16, 17].

Four of the articles defined transdisciplinary collaborations (TDC). According to them, TDC incorporates experiences and knowledge of more than one sector [14, 15]. Holmesland, Seikkula [32] define TDC as ongoing integrative process, in need of commitment, flexibility, sustainable negotiation and maintenance. While, Schensul, Nastasi [33] said ideal TDC must outlived pressures at the societal, regional, national and international levels.

Six of the 57 papers described multidisciplinary, interdisciplinary, and transdisciplinary (MIT) collaborations, as a non-delineated integrative processes [16], combining more-than a discipline [14], lack of distinct definition [12, 34], and does not guaranteed realization of the intended outcome, and is also far from being un-problematic [26].

Environment & Health governance

Articles on governance sectors that deals with health and environment as one were reviewed for their contributions toward disciplinary collaborations, for the mitigation of issues found at the intersection of natural environment and human health. The results highlight the concept of governance in relation to health, environment and global health as disciplines.

Governance: Contribution derived from governance perspective includes risk management, decision-making, accountability, and policy implementation [35, 36] processes, apply by the governance sectors



(actors/players). Governance sectors are the state sector (public/government), private for profit sector (business/corporate), and non-state sectors (civil society organizations) [21, 35, 37, 38]. Governance process is confounded by contemporary challenges of corruption, poor incentives, weak coordination etc. [35, 38, 39].

Environmental Governance: The study further revealed that environmental governance is a multi-stakeholder governance space [21, 38, 39], through which project decision and implementation occurs [21, 40, 41], in collaboration or through participation among stakeholders [41], invoking normative and analytical paradigms [42].

Health Governance: Health governance is a public sector focus [43], in which health problems are identify and address [37, 44]. It is dominated by six domains of activities: 1) data collection 2) policy formation and direction 3) implementation 4) partnership and collaborations, 5) organizational structure and 6) accountability [37]. Implementation of solutions to health challenges [44] is multi-sectoral and collaborative [37, 44].

Global Health Governance: Global health governance employs health governance process to manage health issues and environmental threat across national boundaries [45-47], in collaborations [48] Collaborative governance at international level check the threat of knowledge gaps through joint project implementation among diverse disciplines [49].

Relationship between urbanisation & natural environment

Some of the 57 articles highlights relationships between urbanization and natural environment to make sense of sustainable urban development. As such, relationship are drawn from the field of ecological public health and health geographies respectively, based on the review outcome.

Ecological Public Health: Buse, Oestreicher [50]; Middleton and Saunders [51]; Parkes and Horwitz [45] reports that disciplines of ecological public health (EPH) denotes understanding of ecosystem, health, sustainability, and environmental determinants of health, through utilization of multiple data [41] that links linked-up urbanization, human health and environment [23, 29, 52, 53], focusing on sustainable urban development and social equity [53]. According to Li [54]); and O'Brien, Berry [55]), EPH



connect ecological determinants and health. While, Hanlon [29]; Li [54]; Li, Wang [23]; and Middleton and Saunders [51] illustrates how stakeholders mitigates ecological threat on urban environment.

Health Geographies: Fletcher-Lartey and Caprarelli [56] reports that knowledge of health geographies (HG) is used to conceptualize environment and health issues as one. Andrews, Chen [57] opined that HG connect place, health and wellbeing, and insight on health effects in relation to environment [57], and how individuals experienced health in similar locations [58]. Fletcher-Lartey and Caprarelli [56]; Iroaganachi and Ufere [59]; and Njoku, Ukaegbu [60] explains that HG provides valuable information to health professionals. Another contribution of health geographies is through disease surveillance and mapping of pattern, distribution and interpretation of diseases particularly during epidemic [56]. HG helps in cconnecting the impact of location specific environmental hazards on human health and also predicts a likelihood of natural hazard occurrence [61] along with potential solutions thorough transdisciplinary collaboration [62], for sustainable urban development, because sustainability is predominantly transdisciplinary [26].

Table 2: Summary of the disciplinary contributions

Disciplines	Contributions	Authors
	Risk management, decision-making, accountability, and implementation	[35, 36]
Governance	Three sectors (actors/players): state sector (public/government), private for profit sector (business/corporate), non-state sectors (civil society organizations)	[21, 35, 37, 38]
	Challenges: corruption, poor incentives, weak coordination	[38, 39, 63]
Environmental Governance	Multi-stakeholder arena	[21, 38, 39]
	Decision and implementation	[21, 40, 41]
	Collaboration and Participation	[41]
	Normative and analytical paradigms	[42, 64]
	Public sector focus	[43]



Health	Identify and address health problems	[37, 44].
Governance	Six domains: 1) data collection 2) policy formation and direction 3) implementation 4) partnership and collaborations, 5) organizational structure, 6) accountability	[37]
	Implementation of solutions	[44]
	Multi-sectoral and collaborative	[37, 44].
Global Health	Decision and Implementation beyond national boundaries	[45-47]
Governance	Collaborations among disciplines	[48]
	Solutions to environmental threat	[46]
Ecological public health	Ecosystem, health, sustainability, environmental determinants of health	[45, 50, 51]
	Multi-data collection tool	[41]
	Links urbanization, human health and environment	[23, 29, 52]
	Links urban environment, public health, sustainable development and social equity	[53]
	Connect ecological determinants and health	[55] [54]
	Illustrates how stakeholders mitigates ecological threat	[23, 29, 51, 54]
Health geographies	Conceptualize environment and health issues	[56]
	Connect place, health and wellbeing	[57]
	Provides insight on health effects in relation to environment	[57]
	How individuals experience health in similar locations	[65]
	Provides valuable information to health professionals	[56, 59, 60]
	Mapping of pattern, distribution and interpretation of disease during epidemic	[56]



	Disease surveillance	[56]
	Connect the impact of location specific environmental hazards on human health	[61]
	Predicts a likelihood of natural hazard occurrence	[61]
	Potential solutions thorough transdisciplinary collaboration	[62]
	Sustainable development enhance balance between healthy people and healthy environment	[66] [67]
Sustainable development	SDGs reflects the three-dimensional scope of sustainable development (social, economic, and environmental)	[68]
	SDGs denotes effective governance mechanism	[9, 69]
	SDG number 3 focused on health and well-being, while SDG number 11 focus on sustainable urban environment	[70]
	Specifically SDG 3.9 aims to minimise effects of environmental hazard on human health	[71]
	SDG 11 is city's physical safety intrinsic	[72]
	Transdisciplinary means: Collaboration across cultural boundaries, disciplines (academics), non-academic (managers, planners & local communities), & organizations (public, private and non-state sectors)	[13, 14, 16, 17]
	Transdisciplinary collaborations (TDC): Beyond one sector, incorporate experience and knowledge, linked management, policy and science.	[14, 15]
Disciplinary Collaboration	TDC: ongoing integrative process	[32]
	TDC: Need commitment, flexibility, sustainable negotiation and maintenance.	[33]
	TDC must outlived societal, regional national and international pressures	
	Multi, inter and transdisciplinary(MIT): Non-delineated integrative processes.	[16]
	MIT: Combine more-than a discipline	[14]
	MIT: Lack distinct definition	[12, 34].
	MIT: Does not guaranteed reaching the intended outcome	[26].
	MIT: Far from being un-problematic	



Sustainable Development

Implementation of planetary health demand resources and techniques that put together factors of sustainable development (social, economic, and environment) as health determinants [19]. Sustainable development enhance a balance between healthy people and healthy environment [66, 67] as outlined in the Sustainable Development Goals (SDGs). Governance of the SDGs thrives on the coordination of three factors of sustainable development (Blomstedt et al. 2018) and effective decision mechanism [9, 69]. Among the 17 SDGs, number 3 focused on health and well-being, and number 11 on sustainable urban environment [70]. Specifically SDG number 3.9 aims to mitigates effects of environmental hazard on human health [71]. While SDG 11 focus on city physical safety [72].

Discussion

Transdisciplinary collaborations (TDC) between disciplines and/or sectors are needed for effective decision making [2]. In this regard, the complex nature of environment and human health require integrated approach in form of TDC, to manage the challenges confronting them [22]. As such, the review explores how different disciplines with stakes in health and environment, conceptualised TDC in the context of planetary health [19]. According to Schütte, Gemeinne [49] solutions to planetary health challenges lies in exploration of transdisciplinary collaboration across health and environment sectors.

In this regard, the review, for example identified the contributions of health geographies (HG) for planetary health enhancement. HG in partnership with other disciplines thorough transdisciplinary collaboration helps in cconnecting the impact of location specific environmental hazards on human health and also predicts a likelihood of natural hazard occurrence [61], [62] for sustainable urban development, because sustainability mechanism is predominantly transdisciplinary [26].

However, the existing gaps between transdisciplinary research and the looming environmental challenges constitute a barrier to achieving planetary health aspirations [73], especially the ones focusing on



achieving sustainable urban development. As such, planetary health demand a real evidence based approach for maximum effect that can mitigate health consequences of environmental changes [1], through sustained and stable urban environment [27, 28]. The connectivity between environment and health, makes transdisciplinary collaborations for planetary health a necessity for better understanding of the intersections between humans and their environment [18]. Also, evolving anthropogenic pressure call for shared knowledge, around public health and environment applying holistic transdisciplinary thinking [50, 74]. Therefore, potential opportunities to reduce the impact of environmental changes on health exist in disciplines with stake in health and environment governance [19].

Consequently, sustainable urban development employs transdisciplinary outlook that links Sustainable Development Goals' (SDGs) indicators relevant to human health, wellbeing and environment [2, 18, 19]. Ideal sustainable urban development thrives on approaches that considers the connections between environmental change and human health [20-22], and their interdependence [23]. Indeed, disciplines that collaborate to enhance sustainability of urban environment are inter-related through their strategic objectives and action [4, 26].

In this context, mitigating environmental changes impact on health for sustainable urban development is significant [3, 25], but difficult and challenging [22] to accomplish. Achieving it demands collaboration and contributions from disciplines with stake in population health and urban environment [23, 45, 75]. Additionally, preserving human health and the environment are global issues, as such demand contributions from global health actors.

Strength & Weakness

The study presents various means of mitigating the impact of environmental changes on human health, from disciplinary perspectives, and understanding that economic, social and environmental factors are essential to achieving sustainable development and human health at large, though the identification of threats and provision of solutions. However, the study did not fully explore how transdisciplinary



collaboration are formed, for the purpose of managing planetary health challenges. Despite this, the study established that adoption of disciplinary contributions for transdisciplinary pursuit to environment and human health protection in the Anthropocene epoch is instrumental to achieving inform decision and implementation of planetary health solutions.

Implication

Planetary health argues that urban and natural environment and health are indivisibly linked, and it has been suggested that inter and transdisciplinary approaches focused on addressing the sustainable development goals are needed to address their complex interdependences.

Conclusion

The review highlights the contributions of individual disciplines with stake in environment and health through transdisciplinary collaboration (TDC). For instance, disease surveillance through the use of GIS tools by health geographers, and how application of ecological thinking in public health guides sustainable urban development. Additionally, achieving TDC based on the presented disciplinary contributions require relevant knowledge, experience, and effective governance among other factors. Succinctly, the review presents disciplinary contributions that did not directly address planetary health challenges, but in its hindsight could be used as a reference material toward building and implementation of the needed planetary health TDC.

What is already known on this subject

- Potential opportunities to reduce impact of environmental changes on health exist across disciplines.
- Solutions to planetary health challenges lies in exploration of transdisciplinary approach

What this study adds

- Theorisation of disciplinary contributions from disciplines with stake in environment and health as one for planetary health.



- Various means of mitigating the impact of environmental changes on human health, from disciplinary perspectives for sustainable urban development were explored.

Additional files

No additional files

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Competing interests

The authors declare no competing interests.

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