Planetary Health challenges a hub for transdisciplinary collaborations and sustainable development

A team of experts discuss the burden of HBV infection, factors enhancing its spread and the challenges of controlling the spread of the infection in Africa. They also recommend some strategies that will help in achieving the 2030 goal of elimination of HBV in Africa.

Planetary health as a field of scientific inquiry focused on addressing the challenges posed by environmental changes on human health [1], and the state of natural systems through transdisciplinary collaborations (TDC), for sustainable development. The process brings together diverse interest groups to mitigate climate change, protect biodiversity, enhance food security, promote sustainable land use etc., and all other processes that aims at safeguarding human health in the Anthropocene [2- 4]. Attention accorded to economic development at the expense of environmental sustainability place planetary guards at risk of poor mitigation [5]. According to World Health Organization 25% burden of global disease are caused by modifiable environmental factors related to air, water, soil, and food [6]. Indeed, planetary health require greater commitment to knowledge discourse that leverage environmental changes with impact on human health [2, 3].

Planetary health challenges could be best managed through application of transdisciplinary thinking [7, 8]. Recently, transdisciplinary approach to research and learning is gaining recognition, due to the fact that disciplinary specialization creates exclusion, division and isolation in the context of increase contemporary multi, inter, and transdisciplinary adoption to research and learning [9].

Moreover, planetary health issues are not categorised into disciplinary silos due to their complexity and multiplicity, which makes their management by individual discipline challenging [10,11]. This was partly due to lack of cooperation between disciplines and/or between society and researchers [12]. Sometimes collaboration occurs between disciplines for selfish reasons, and as such attract little attention [13, 14, 15].

Against this background, the study aims to highlight planetary health challenges and provide a synopsis on TDC as a means of addressing the highlighted challenges by answering the following questions: What is planetary health? What are the challenges confronting planetary health? What is transdisciplinary collaboration? How TDC addressed planetary health challenges? How to form and maintain reliable relationship in TDC? How does transdisciplinary collaborations address unforeseen issues?

Methodology

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. Additional search was performed in Google Scholar to identify literature on floods based on the cited references in the narrowed articles for inclusion.

Criteria for inclusion

The inclusion criteria utilized were as follows:

- Articles published on the 1st January 2008 to 31st December 2018 (to date), except for two articles, which were considered based 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 Planetary health & Transdisciplinary collaborations

The selected literature has at least to 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. The search stages of this study were as follows:

Search technique

A search technique targeting relevant literature that address the questions raised on planetary health and transdisciplinary collaborations was used. To arrive at the literature, combination of search keywords was utilized, thus; planetary health, challenges confronting planetary health, transdisciplinary collaborations, relationship in transdisciplinary collaborations, and issues in transdisciplinary collaborations (See table 1).

The literature review search was exclusively systematic, while the presentation of the adopted text

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was both systematic review and narrative synthesis [16]. Narrative synthesis is particularly relevant in a situation where statistical approach is not considered, and combination of findings from multiple studies, focusing on a wide range of question is adopted [17]. The process of the review begun by removal of duplicate articles, then abstracts and conclusions were checked and reviewed for inclusion. The initial search for planetary health & Transdisciplinary collaborations returned [2,192,112] articles, narrowed to 87 and 30 respectively. The selected text was analysed carefully and critically synthesised and included in the review (see table 1).

Table 1: Search technique & articles selection

Theme	Search words	Returned	Narrowed	Selected
Planetary health & Transdisciplinary collaborations	Planetary health	58	29	13
	Transdisciplinary Collaborations	2,191,540	12	10
	Trans discipline	514	51	12
	Total	**2,192,112**	**87**	**30**

Overview of Planetary Health

The term Planetary health gained prominence between the 1980s and 1990s [2], and in 2015 becomes a field of scientific inquiry [3], and policy. Planetary health highlights relationship between human health and state of natural systems [18,3,4]. In this regard, [1] defined Planetary health as a subject that explores the influence of environmental changes on public health for planning and policy within ecosystems realm. Others posit planetary health as a concept that highlights environmental changes with effect on human health [19, 2, 20].

In brief, the notion of planetary health is wide; it encompasses environment, human health, transformation, collaboration and multisector integration (4), among others for sustainable development (1). Sustainable development (SD) thrives, also, on transdisciplinary collaborations by exploring the connections between disciplinary domains, for conceptual and analytical spaces, through which obscured disciplinary inquiry are reconciled and synergized (2). Planetary health challenges and sustainable development paradigm aspire to manage the present human's interaction within the planet's natural systems, to safeguard the future (4), as such, the fields demand transdisciplinary approach to thrive.

Whitmee et al. [4] identified three major challenges to planetary health: They are; 1) imagination 2) knowledge gap and 3) governance challenges. 'The consequences of these challenges are far reaching', says [3] considering the effect of environmental changes like climate change on water pollution, fishing, land contamination, and ocean acidification among others on human health [4]. Indeed, the trend calls for collaborative actions to counter the failure of the current approach [8,]. The time to curtail this trend is now, there should be no excuse from the constituencies with stake in improving health and environmental change [4]. Therefore, the starting point toward achieving the feat is support for research on the intersection between environmental changes and population health [6,7]. TDC denotes unprecedented opportunities for mitigation through advocacy and treaties for protection of health in the present and longterm term [4].

Coutresy of Graeme Williams-Panos

Solutions are within reach, and do not totally rely on technology, but on determination and strong political will [20]. Additionally, SDGs provide opportunity of addressing planetary health challenges, by extrapolating it potentials as transdisciplinary subject at the intersection of human health and that of the planet's natural system [1].

Transdisciplinary Collaborations

Prefixes like multi, inter, trans. etc. attached to root word 'discipline' denotes an engagement of two or more disciplines in the pursuit of a shared goal. The prefix indicates specific interdependency among the engaging disciplines [9]. For example multi-disciplinary – denotes disparate disciplines working toward a common goal but act separately; inter-disciplinary – denotes a fusion of disciplines; while trans-disciplinary – denotes grouping of diverse disciplines, particularly academics in pursuit of common goals [11]. This study focusses on transdisciplinary collaborations.

Transdisciplinary collaborations (TDC) integrate different disciplines based on knowledge and experience; it explores association between factors and outcomes; and it also guide understanding and identification of joint problems for sustainable solutions [7]. TDC is formed for diverse reasons, those in the academics may form TDC to generate knowledge and publish articles;

private for-profit organizations may join with the aims of profit maximization, while discharging their corporate social responsibility (CSR), while, NGOs may join to exert pressure on private and public sector to enhance activities in question. As such, TDC guides understanding of disciplinary needs, development of methodology, mutual accountability, and strategic problems solving approach [3].

Sometimes TDC is marred by lack of clearly defined objective, improper disciplinary integration, deficient strategic planning, domination by certain discipline, poor communication between disciplines, lack of knowledge, dysfunctional funding mechanism, and contradicting hierarchy, structure and coordination [15]. Therefore, TDC requires understanding of shared roles and responsibilities of each project team [7].

Planetary Health Emergence Transdisciplinary Collaborations

Planetary health as a field of inquiry needs combined efforts and contributions from a wide range of disciplines like natural sciences, health, engineering social sciences and governance sectors [14]. In this regard, planetary health seeks transdisciplinary collaborations, for knowledge acquisition and sharing across disciplinary boundaries, through reliable relationships and cooperation. Also, the intersection between environmental changes and human health, allows TDC to explore specialities, formalities and professionalism of the disciplines in collaboration for inform policy formation and decision implementation [7].

Additionally, the deteriorating state of the ecosystem calls for transdisciplinary management, to reduce the threat confronting it[2]. TDC approaches enables knowledge and problem-solving skills sharing, through dialogue for holistic sustainable solutions[7]. However, a crucial puzzle in TDC, is how to achieve effective collaborations among disciplines and sectors.

How to form and maintain reliable relationship in TDC?

Building and maintaining TDC begins with shared interest and justification for participation by the collaborating bodies. Then quality of interpersonal relationships, communication, trust and accommodation of differences [6]. When potential collaborators agree on structure, procedures and other protocols; the following issues are significant TDC's success moderators:

Trust

Building trust among collaborating disciplines is highly significant in maintaining relationship. Trust building thrives on transparent procedures especially at a time when relationship is subject to survival test, following negative outcome or fracas. Trust development is a gradual process in need of commitment, accountability and responsibility, devoid of exploitation from all parties involved [1].

Training

Training of TDC's participants is significant in the maintenance of a successful collaborative relationship. Training nurtures theoretical and methodological understanding of project issues in contention. Training enables TDC participants to keep abreast with language and culture of disciplines involved in a project. Training provides the needed skills with which to overcome challenges, particularly those that sub-consciously draw participants back to disciplinary siloed approaches, rather than the needed cross-disciplinary input for TDC [9].

Knowledge Integration

Knowledge integration is part of TDC objectives and strategic processes. Knowledge integration allows interaction of experience, ideas, information, innovation and skills among collaborators (5).

Multiple Engagement

Multiple engagement denotes voice diversity of disciplines, target benefactors, and various methods and approach adoption for TDC [4]. Multiple engagement enhance familiarization of disciplinary levels of engagement, processes and teamwork [4].

Integrated Management

Integrated management in TDC refers to the approach employed in managing different disciplinary needs in a collaborative project. It encourages informal conversation on issues bothering the project, to learn from each other. Integrated management allows collaborators solve complex challenges, through disciplinary participation and commitment [3]. To this end, solving planetary health problems depend on coordinated TDC at all levels of governance and the ability to solve unforeseen issues, circumstance or differences among the disciplines in TDC.

How does transdisciplinary collaborations address unforeseen issues?

Every aspect of project life in TDC should be distinct, clear and free of ambiguity. The disciplines in a collaboration should understand their basic differences in concepts like methods, culture, objectives and boundaries, including system of communication, protocols, tools and epistemology. Additionally, administrative structure and resources; planning, adequate time, monitoring and evaluation frames are critical TDC outcome metrics [9]. The attainment of the aforementioned attributes helps in avoiding unforeseen circumstance in collaboration.

Qualitative judgemental skill should be employed in assessing TDC engagement process, avoiding reliance on single discipline for decision making [8]. A good sense of judgement allowed free flow of shared communication, which support collaboration and innovation. Indeed, side conversations and smaller meetings between two or three disciplines create trust [3], an important feat in conflict resolution. Informal engagements during workshops and meetings helps in identifying loopholes at earlier stages. Other important factors worthy of consideration when building TDC includes stakeholders' identification, participants and leaders' selection, roles identification and distribution, identification of common

and differential interest, and development of acceptable protocol and processes [3].

Sound understanding of how contextual factors influence the effectiveness of transdisciplinary collaboration within diverse disciplines suggest extrapolations with caution, due to disciplinary differences. Also, disciplines in collaboration should be conscious of goals changes overtime, depending on the stage of the project[11]. Additionally, inherent complexities of TDC effectiveness must be identified and address accordingly. Minimum success requirement of a project should be outline prior to TDC kick up, and additional investment on other influential requisites should be available. Importantly, fund allocation should receive high priority prior to launching of a project, especially in a project with large number of participants, diverse goals, and disciplines with diverse leadership styles [14].

Reconciliatory committee membership within TDC should cut across the paradigm of the disciplines in collaboration. Wider membership enhanced familiarity, flexibility and creativity for integrated solutions. Members with proven teamwork skills should be given preference, because of their potential to contribute [14]. TDC projects involve significant theory, methods, skills and knowledge sharing for effective participation, bind on mutual commitment addressing project objectives, reflective of opportunities for professional and personal development in participatory spirit. Therefore, selection of disciplines for TDC should be carried out in variation of each discipline, avoiding stereotype and assumptions. Each, discipline should be assessed based on its ability to contribute. Respect is another factor that needs to be maintained among disciplines through personal relationship all the time [12].

Emergence TDC provides an opportunity for understanding various impacts of environmental issues on health [13], such as, the effect of natural disasters like floods, wild-fires and drought among others and their management. For example, the effect of floods on urban settings is not the physical one alone, it includes psycho-social impact on daily life during the episode. Moreover, to make sense on flood pathways and it impact on health, a brief outlook of urbanization and urban health in the context of environmental hazard, would provide a more complete picture of how flood disasters impact the health of individuals and communities from diverse disciplinary perspectives, in urban settings [14].

Conclusion

In this paper, planetary health transdisciplinary collaboration processes and the confounding challenges to the achievement of sustainable development are highlighted. The identified challenges include isolation, separation and divergent experience of individual disciplines among others. Ideal concept of planetary health thrives on environmental sustainability and TDC, which implies that challenges confronting planetary health cannot be managed by one specialty, indicating 'disciplinary inadequacy', as such demands for contribution through collaborations from diverse disciplines. The study further reveals that transdisciplinary collaborations enhanced disciplinary interactions, guides conceptualization of methodology and objectives of a project, and understanding of the needed solutions through shared problem-solving techniques. Additionally, systematic understanding of the TDC arrangements in health and environmental research, for the conduct of successful transdisciplinary collaborations for sustainable development.

References

1. Osofsky SA, Pongsiri MJ. Operationalising planetary health as a game-changing paradigm: health impact assessments are key. The Lancet Planetary Health, 2018;2 (2):e54-e5.
2. Needoba J, Tratnyek PG. Planetary Health thematic web collection. Environmental Science: Processes & Impacts. 2018
3. Prescott SL, Logan AC. Larger than life: injecting hope into the planetary health paradigm. Challenges. 2018;9(1):13.
4. Whitmee S, Haines A, Beyrer C, Boltz F, Capon AG, de Souza Dias BF, et al. Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. The Lancet. 2015;386(10007):1973-2028.
5. Brandi C. Safeguarding the earth system as a priority for sustainable development and global ethics: the need for an earth system SDG. Journal of Global Ethics. 2015;11(1):32-6.
6. McMichael AJ, Friel S, Nyong A, Corvalan C. Global environmental change and health: impacts, inequalities, and the health sector. Bmj. 2008;336(7637):191-4.
7. Boischio A, Sánchez A, Orosz Z, Charron D. Health and sustainable development: challenges and opportunities of ecosystem approaches in the prevention and control of dengue and Chagas disease. Cadernos de saúde pública. 2009;25:S149-S54.
8. Brousselle A, Butzbach C. Redesigning public health for planetary health. The Lancet Planetary Health. 2018;2(5):e188-e9.
9. Prior J, Cusack CM, Capon A. The role of pliability and transversality within trans/disciplinarity: Opening university research and learning to planetary health, in Transdisciplinary Theory, Practice and Education. Springer. 2018;57-71.
10. Barrett MA, Bouley TA. Need for enhanced environmental representation in the implementation of One Health', Ecohealth. 2015;12(2):212-9.
11. Stock P, Burton RJ. Defining terms for integrated (multi-inter-trans-disciplinary) sustainability research', Sustainability. 2011;3(8):1090-113.
12. Bernert P, Haaser A, Kühl L, Schaal T. Towards a Real-world Laboratory: A Transdisciplinary Case Study from Lüneburg. GAIA-Ecological Perspectives for Science and Society. 2016;25(4):253-9.
13. Bodin O. Collaborative environmental governance: Achieving collective action in social-ecological systems. Science. 2017;357(6352).
14. Zscheischler J, Rogga S, Busse M. The Adoption and Implementation of Transdisciplinary Research in the Field of Land-Use Science—A Comparative Case Study. Sustainability. 2017;9(11):1926.
15. Snilstveit B, Oliver S, Vojtkova M. Narrative approaches to systematic review and synthesis of evidence for international development policy and practice, Journal of development effectiveness. 2012;4(3):409-29.
16. Popay J, Roberts H, Sowden A, Petticrew M, Arai L, Rodgers M, et al. Guidance on the conduct of narrative synthesis in systematic reviews. A product from the ESRC methods programme Version. 2006;1:b92.
17. Buse CG, Oestreicher JS, Ellis NR, Patrick R, Brisbois B, Jenkins AP, et al. Public health guide to field developments linking ecosystems, environments and health in the Anthropocene. J Epidemiol Community Health. 2018;72(5):420-5.
18. Horton R. Offline: Planetary health—worth everything, The Lancet. 2018;391 10137:2307.
19. Pereira L, Karpouzoglou T, Doshi S, Frantzeskaki N. Organising a safe space for navigating social-ecological transformations to sustainability. International journal of environmental research and public health. 2015;12(6):6027-44.
20. Umar I, Jason HP. Review of Disciplinary Contributions to Planetary Health Collaborations Focused on Sustainable Urban Development: An Integrated Approach to Sustainable Development Goals 3.9 & 11.3. Development research (TIJASDR). 2021;6(2):2067-4112