



Complexity in Global Health– Bridging Theory and Practice

VIEWPOINT

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ABSTRACT

Increasingly, health reflects an integrated outcome of a growing globalized system. Economic, political, cultural, environmental, and other global processes profoundly influence how we understand and approach health challenges. As these occur in a webbed, dynamic, and interdependent fashion, health can be viewed as a complex issue. Drawing from this understanding, in this viewpoint, I assert applying complexity theory to produce a definition of the field of global health. Complexity theory tenets such as non-linearity, transdisciplinarity, open-system analysis, and global-local phenomenology can provide a theoretical basis for a substantive understanding of global health phenomena and a richer instrumental approach to global health challenges. Harmonization between complexity theory and global health may provide the foundation to close the health equity gap put forth by the global health agenda.

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Despite the integration of these fields within global health, global health today is still dominated by international clinical practice and biomedical approaches [21]. The latter is evidenced by the overwhelming majority of global health practitioners trained as physicians or public health specialists, and by the fact that most global health programming is created from medical and public health institutions, which influences the channels of scientific distribution [21, 22].

Within this context, and despite the call for integration from stakeholders throughout the global health arena, the field is at a discursive impasse dominated by debates on the object, types, and purpose of knowledge in global health [15]. For example, global health as the study of globalization and health; global health as the study of transnational health issues; global health as the way towards global equity in health; global health as international public health [20, 23, 24]. This impasse has partly been due to gaps in the theoretical frameworks that can be uniformly applied to global health, especially one that could capture the dynamism and multilayered realities of global health today [25].

Furthering the divide, existing global health frameworks pose a synthetic view of global health processes, isolating them in geo-spatial silos and into different fields of practice. For example, within the field of global health, anthropologists studying the relationships of culture and health, economists understanding the impact of international trade on health, clinicians studying the pathophysiology of neglected diseases, and human rights specialists understanding the implications of international treaties in health policy, to name a few. Orphaned of a comprehensive theory to guide global health practice, global health will continue to be, as Paul Farmer stated almost ten years ago, merely a “collection of problems” [25].

The implications for this lack of clarity in definition and theory for global health go beyond pure semantics. Without an established agreement on what we intend to mean by global health, as Koplan et al. state, “we cannot possibly reach agreement about what we are trying to achieve, the approaches we must take, the skills that are needed and the ways that we should use resources” [23]. Furthermore, this deficiency in global health theory, as argued by Arthur Kleinman, “...may or may not have slowed progress in developing and implementing programs, but it surely has limited the education of practitioners and the emergence of an intellectually robust field” [26].

Acknowledging this disconnect of global health from theoretical underpinnings, Kleinman asserts the importance of approaching global health from a theoretical perspective. In his arguments, and as one of the few scholars that have attempted to approach global health from a theoretical lens, Kleinman [26] advocates for social theory in global health practice. Although he argues for a variety of perspectives being brought into global health theory and practice (i.e., structural violence, the social construction of reality, biopower, and purposive action), he concludes that his approach is far from exhaustive and calls for further discussion for the generalization of practice and the construction of knowledge in global health [26].

Most recently, there has been a shift in how scholars and other actors are starting to address global health. For example, Arya and Allison [12] explicitly address the complexity of global health phenomena, making a call to change global health practice and making it “less about service delivery and more about understanding and addressing the deeper structural issues” [12]. The intention is also to capture the multifaceted aspects of global health practice while highlighting that global health actors must come together and create local and global networks that span sectors and scientific disciplines.

Similarly, efforts to frame global health education in an interconnected and interdependent world have also sprung forward. Both the Association of Schools and Programs of Public Health and the Consortium of Universities of Global Health have made significant contributions to creating competency domains in global health that expand beyond international clinical practice (e.g., ethical reasoning, program management, capacity strengthening, strategic analysis) [1, 27]. Concomitantly, the discourse has also moved towards the need for interprofessional education in a collaborative environment. Rowthorn and Olsen [28] emphasize that given the complex realities of global health practice, interprofessional education and subsequent work are vital to meet global health demands.

Nonetheless, despite these *new* commonalities within current global health discourse and the recognition of these interwoven realities, emphasized even more during the COVID-19 syndemic, the global health community has not matched this shift with an equal response to create a shared framework of both knowledge and instrumental approaches [29]. Hyper-specialization, power/knowledge imbalances among and across disciplines, irreconcilable epistemological differences, reductionism in theory and practice, institutional structures, and administrative hurdles might be behind these gaps [8, 10]. This lack of theory used to inform and construct global health knowledge/practice, and furthermore, this diverse understanding of what is meant by global health, has led, in many cases, to an unstructured, inefficient, and disorganized response to the pressing health issues of today.

TOWARDS COMPLEXITY

Complexity science is a discipline that has been on the rise for at least 50 years. Most recently, there has been a resurgence of complexity theory (CT) in the scientific community, partly explained by the increasing impacts of globalization and the push for interdisciplinary work in the face of complex challenges. Complexity theory and science are, in essence, the study of complex adaptive systems (CAS) [30]. In contrast with traditional Newtonian and Cartesian sciences, CT avoids reductionist approaches that break down phenomena and systems into simple and smaller components. As Morin [31] states:

In opposition to reduction, complexity requires that one tries to comprehend the relations between the whole and the parts. The knowledge of the parts is not enough, the knowledge of the whole as a whole is not enough ... Thus, the principle of reduction is substituted by a principle that conceives the relation of whole-part mutual implication. The principle of disjunction, of separation (between objects, between disciplines, between notions, between subject and object of knowledge), should be substituted by a principle that maintains the distinction, but that tries to establish the relation.

CT focuses on the dynamics of interdependence between system components and the properties emerging from these interactions. It also studies non-linear relationships, uncertainty, feedback mechanisms, and adaptation amongst systems. CT considers context and historical trajectories to understand systems' behavior [30, 32]. Furthermore, complexity theory emphasizes “methodological pluralism” [33] as a central mechanism for understanding diverse, multidimensional phenomena. Such CT concepts have been applied to systems such as the human brain, stock markets, infectious diseases, and ecosystems [34]. A key difference from complementary approaches, like systems thinking and socio-ecological models, is the unique pathways that emerge from complex analysis as different ways of knowing interact amongst each other [30, 32].

In the last half-century, complexity theory has influenced various fields, including climate research, economics, and biology. In the area of health, CT has been applied to clinical medicine [35], nursing [33], health services management [36], and health policy [37], among others. However, complexity theory has seldom been explored as a framework for global health theory and practice.

CURRENT APPLICATIONS OF COMPLEXITY THEORY IN GLOBAL AND PUBLIC HEALTH

According to Pearce and Merletti [38], applying this emerging worldview to public health can lead to a more comprehensive analysis of public health challenges. For example, by asking questions beyond specific health phenomena from a biomedical perspective (e.g., malaria in a given community) and focusing on processes and relationships amongst system components in relation to health challenges (e.g., health systems, environmental context, international funding, historical aspects, sociocultural variability in relation to malaria – following the example above), CT's application can reveal findings that can create more comprehensive solutions (i.e., emergence of new ways of understanding) at a local level. In this sense, CT seeks system-wide approaches and not *silver bullet* solutions. Similarly, but inversely, Frenk et al [14]. highlight the importance

of attaining diverse global knowledge (e.g., of global health governance mechanisms) to achieve effective and equitable actions at a local level.

The very nature of complexity demands a transdisciplinary way of thinking and acting. Jogerst et al. [1] and Martens et al. [5] argue that cross-fertilization of disciplines plays a vital role in the face of current challenges due to the emerging and pluralistic contextual knowledge of global health phenomena. Simultaneously, many Indigenous scholars have argued that only through transdisciplinary approaches that incorporate many ways of knowing can we achieve our common goals [39].

Frenk et al. [14] have additionally suggested, albeit with other terminology, that applying the multiply ways of knowing included in CT will likely shift some actors' roles in global health practice. This is especially important for the meaningful inclusion of communities in global health. Parkes et al. [40] suggest that integrating CT into health practice, in their case, the study of infectious disease, allowed for horizontal and vertical integration of stakeholders with a concomitant inclusion of perspectives and types of knowledge in infectious disease control. This approach, according to the authors, has the potential to create global health policy and action that is well-informed and contextualized to particular needs. Likewise, putting communities at the core of the health production process will allow comprehensive approaches representing core values of global health practice such as equity [5]. In this regard, CT has the potential to advance the global health equity agenda.

Another application of CT into the global health field has been in the analysis of global health governance. For example, Fidler [41] highlights that current theoretical models to understand health governance do not apply to global health, in part due to what he calls "open-source anarchy" (a fluid, interconnected system added to a lack of overarching governance structure to oversee global health governance processes). According to Haffeld [37] and Martens et al. [5], the understanding and framing of efficient global governance systems (one of the grand global health challenges in times of COVID-19) as complex adaptive social systems might also benefit from the application of the CT framework. Previous to this and in a 2009 report, the World Health Organization (WHO) stated that systems thinking (closely related to complex thought) "has huge and untapped potential, first in deciphering the complexity of an entire health system, and then in applying this understanding to design and evaluate interventions that improve health and health equity" [42(pp.19)]. However, despite these calls to action, there is little evidence of these applications in practice, at least in the scientific literature.

Considering global health's track record, one area of particular interest in global health practice that might benefit from the application of CT is that of the study of unintended consequences. Albrecht et al. [8], in explaining the role of CT, state "[A]t a minimum, trans-disciplinary understanding would suggest intervention avenues that would not make the problem worse, something that has occurred when culturally inappropriate or iatrogenic 'solutions' to health problems have been used". Similarly, Kleinman [26] highlights the importance of providing tools for reflection in global health practice that can analyze the contextual conditions that lead to unintended consequences. Examples in the global health literature abound in this regard (see, for example, Biehl and Petryna [17]; Yamin [43]).

The tenets above, coupled with emergent findings from this approach (e.g., epidemiological complex modeling of infectious diseases like COVID-19), could redefine our understanding of global health as a complex discipline. It could also provide a framework for improved global health outcomes. The applications of CT into global health could also redefine and have profound implications for global health academia, including education, research, and practice, as has happened with other disciplines.

We undoubtedly live in a world with increasing global interdependence. This needs to be matched by the rise of capable practitioners that can understand the complex realities of current global health challenges like the COVID-19 syndemic. Therefore, and taking into consideration the gaps between global health theory and practice, in this viewpoint, I argue that the defining unifying theoretical framework of global health should be that of complexity theory. Stemming from

