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Conceptualizing resilience in public health: a philosophical approach

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Abstract

Background The initial inquiry into the concept revealed its usage as a boundary object and how this facilitated its interdisciplinary utilization. The same feature enabled the shift to literature within other disciplines and then identify its conceptualization in them. This led to the understanding that though many disciplines have used the term resilience to describe a phenomenon with a general understanding of "bouncing back to original position", its multi-disciplinary usage has added a lexical ambiguity to the term. The purpose of the study is to utilize this broad and overlapping nature of resilience to identify those elements, models or pathways that might enable conceptualizing resilience in the context of public health. In this process we uncover the underlying philosophical elements that converge or diverge with the whole conceptualization process of resilience in the discipline of public health.

Methods We used a modified integrated review of the body of literature while also reflecting on how the concept of resilience has evolved from a narrow, "Substance Metaphysics," "Reductionist" phenomenon to a more expansive, "Multi-Dimensional," "Intersectional," and "Dynamic phenomenon." Afterwards, existing philosophical theories that converged or diverged with the conceptualization process were used to further validate the entire process that resulted in the definition of resilience in the context of public health emergencies.

Results The critical evaluation of existing literature led to the identification of two patterns by which resilience has been conceptualized across disciplines. One on the basis of engagement with acute or enduring crisis resulting in trajectories that enables stability or growth and transformation. Another on the basis of the levels at which it was conceptualized by various authors from multiple disciplines. The two approaches were later critically evaluated so as to conceptualize resilience in the context of public health.

Conclusion An integrated response to the crisis may be necessary to preserve people's health and the health of communities in order for them to be resilient. Resilience in public health is a result of the successful engagement of relevant stakeholders responsible for health preservation to current and emerging health inequalities that places them in enabling trajectories of sustenance or growth leading to the development of potential capabilities that are sensitive to diverse health disparities.

Keywords Defining resilience, Philosophical approach, Public health emergencies

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Background

The concept of resilience has become increasingly interdisciplinary since its inception in the field of developmental psychology and socio-ecological system research. The interdisciplinary utilization of the concept of resilience in different contexts has given rise to meaning that overlaps with multiple concepts, adding an element of complexity to the term [1, 2]. Authors from different disciplines have defined resilience with reference to their specific contexts, the level at which it is evaluated, and the distinctive pathways that the person or system adapts to in the face of a crisis that leads to resilient outcomes [3]. Therefore, the idea of resilience overlaps across numerous other ideas from different disciplines, making it challenging to draw a line between them on a semantic level and giving the phrase a vague and malleable meaning [4, 5]. This very nature of resilience has facilitated communication and utilization of its diverse meanings and knowledge across different disciplines fostering development of a shared meaning and consensus among multiple disciplines [2, 4]. Though this helps to bridge the gap of knowledge that exists between disciplines and identify a general pattern of understanding of the concept, the different forms of resilience identified from various disciplines are commonly addressed with a single term "resilience", which adds a lexical ambiguity to the term [6]. In addition, many authors have attempted to define resilience from their own perspective, impacted by the values and belief system that they hold within themselves, and this lends a normative dimension to the idea [5]. Resilience must therefore be defined clearly by stating the context, the level at which it is observed, and the approach one would like to adopt in order for the researcher to operationalize the notion for making measurements or inferences from the field [3]. The purpose of this paper is to use the idea of resilience's widespread acceptance and shared meaning across disciplines to help define resilience in the context of public health emergencies.

Specific objectives

The primary objective of the paper is to explore the historic evolution of the concept of resilience from its inception as a potential focus of research in different disciplines to its recent philosophical positioning within the same disciplines with an aim to define the concept of resilience in context of public health.

The secondary objective is to identify the philosophical scope of resilience across disciplines and use the appropriate philosophical positioning of resilience within public health. The study will use different models, theories or frameworks by which resilience has been conceptualised across disciplines to develop and philosophically validate the definition of resilience in public health.

The concept of resilience

The concept of resilience started emerging as an alternative to risk and vulnerability in the field of sustainability and child psychology. This model of viewing resilience as an alternative to risk or vulnerability came to be known as deficient model, where the term resilience was assigned a negative connotation [7, 8]. Models that include risk and vulnerability as an important ingredient for resilience, which utilize positive factors that are present within and outside the system to explain the phenomenon of resilience are generally termed as the broader adjustment model, and such models started assigning positive connotation to the term "resilience" [6, 7]. When notions focussing on the social and environmental determinants of individual health, living conditions and quality of life, started gaining prominence in the field of research, the scope of influence of external factors present in the environment in nurturing resilience at the individual level became wider and accepted across multiple disciplines [9]. Such an approach in which the resilience of an individual or system is not just attributed to the inherent qualities of an individual, but is seen as a phenomenon that develops through the interaction between the latent qualities within the individual and the variables that are present in the environment, is known as person in environment approach [1, 9].

Early attempts to measure resilience involved categorising people or systems into binary categories where the presence or absence of a particular factor was thought to be important in determining how people or systems would respond to a crisis. This method, which classified people or systems into a single homogeneous category of being resilient or not, came to be known as the diagnostic approach [6].

Certain key factors such as having innate ability to cope with stress even at a younger age or development of pro social behaviour to overcome past experience with adversity, were considered as predictors of positive or negative outcome, where attainment of positive outcome in the face of adversity meant resilience [3]. These elements have a dynamic nature since they are subject to changes in the environment. For this reason, a particular factor that allowed a person or system to achieve a positive result in an unfavourable circumstance may not guarantee the same result in a different situation. Thus, achieving resilience in one situation may not necessarily translate into an individual or system reaching a similar outcome in another context [10]. Therefore measuring resilience without accommodating the diversity of outcomes and the pathways that result in such outcomes may fail to capture its multi-dimensionality [11]. When addressing such measurement complexity, one should take into account the non-linearity of the occurrence of events as it may result in a variety of resilient outcomes.

For instance, resilience could be a cyclic process when the system is able to resist or absorb the impact of a perturbation [12]. Alternatively, it can be transformative and spiral when the impact of shock is more than the system's capacity to endure, when the challenge threatens the existence of the individual or system [13].

The system or individual will have a relatively stable trajectory after experiencing a transient perturbation that doesn't produce enduring stress in the system's environment [6]. Such acute stressors will create a negative feedback loop that will enable the system to resist or absorb its impact by using the system's existing capacities [14]. Now, when the shock is more severe, the disruption caused by its influence will endure longer, bringing about long-lasting changes in the system's current function and structure. The system's long-lasting alterations as a result of the shock create the groundwork for continued development and transformation [6].

As a result, literature indicates that numerous authors employed a variety of approaches and models to define resilience while examining its meaning. The concept of resilience has become more ambiguous as a result of the multiple aspects and degrees of abstraction that these various methods and models have attempted to explain. Thus, resilience can mean anything from achieving stability when a system's capacity is able to meet the demands of a crisis, or a process that tends to move the system towards a positive trajectory after a crisis, or a latent capacity of the system or an individual that manifests due to the crisis, or it may be the whole system's transformation when the existing function or structure fails to adapt to difficult circumstances. Therefore, the vagueness found in the literature while explaining the phenomenon of resilience may be due to its complex and dynamic nature that is continuous and non-linear. Overall, if one wants to investigate the dynamic and complex character of resilience, then the strategy must unquestionably take into account its complexity.

Motivation for the study

The initial assumption regarding resilience emerged from the first author's reflections of the field experiences during the Kerala Floods of 2018 in India. The notion of resilience was assumed to work for certain people or systems when they faced an adversity or a crisis, and they tended to sustain or overcome its impact through constructive adaptation to change rather than succumbing to its effects. This in turn made the author to think about why the rest of the individuals/ population have to hold a vulnerable position when it comes to adversity. What might enable resilience in vulnerable populations? Is their vulnerability just limited to certain aspects of their life or does it impact other spheres as well? Is the status of vulnerability itself subject to change, as a vulnerable

population in certain conditions may not occupy the same position when the context doesn't pose a threat to their specific vulnerable position? For example, an individual who has been suffering from a long-term health crisis of sickle cell anaemia may occupy a considerably less vulnerable position when the region where he/ she lives faces an outbreak of Malaria. All this added to the understanding of the concept, and this provided the initial drive to have a further inquiry about the concept at much larger level, especially about how would it be experienced at a community or a health system level.

The primary goal of any public health function is to sustain conditions that preserve health and wellbeing of individuals and communities, health preservation itself is a dynamic process depending on confluence of factors. For enabling public health systems to sustain such essential public health function for health preservation may require structures and processes that are also resilient to crisis of varied nature and intensity. The current study aims to identify those underlying structures and processes, that are relevant for developing resilience in the context of public health. In doing so the study intends to uncover the historic evolution of the concept throughout the existing literature, beginning from its earlier inception where it was conceptualized as a static or fixed phenomenon, to the latest systemic view of the phenomenon. Also in the process, synthesize a definition for the concept of resilience in the context of public health emergencies.

Methodology

The vague identity of the term resilience due to its interdisciplinary usage necessitated a broad and non-linear review of existing literature which is inclusive of both empirical as well as theoretical literature, to understand the diverse methodologies by which resilience has been conceptualized in different disciplines. Methods that could accommodate a broader and non-linear literature review were then identified from literature on nursing and nursing practice, as the search was prompted by one of the author's previous experiences as a Nursing graduate. Two such methods were identified, one which was generally referred as the "Integrated Review" and the other as "Concept Analysis". Both of these methods were suggested for synthesizing concepts in such a way that it could be contextualized in the area where the concept is going to be studied. The authors after rigorously going through few of the literature about "Integrated Review Methodology" [15–19] and " Concept Analysis" [20–23], decided to go with the integrated review methodology with some modifications in order to accommodate the vast and multidisciplinary usage of the term resilience.

The format of "Concept Analysis" for developing concepts considers a strong quantitative requirement for

evolving a concept, and involves describing or identifying a model case with all the attributes of the concept of interest to enable measuring the concept. This was not appropriate for the current conceptualization of resilience because of the concept's highly abstract nature and difficulty in reducing the concept so as to obtain its exact or universal attributes. The presents exercise is not about having a quantitative evaluation of selected papers, but rather to figure out the broader philosophical limits of the concept which then can be utilized to define it in the context of public health. And this would require a process of iteration and reflection that has to happen parallelly with the non-linear literature search of various articles across different disciplines. The authors found that, this kind of flexibility in concept development is better enabled by the integrated review methodology when compared to concept analysis.

The integrated review process

An integrated review methodology as described by Broome, M.E. (2000), in her work "Integrative Literature Reviews for the Development of Concepts" [15], has been considered for this purpose, and this approach has been modified to accommodate the varying types of documents, both empirical and theoretical that were included. The Integrated Literature Reviews for the Development of concepts suggests a series of phases for concept development including concept identification, search process and extraction of information, the integrative review, the synthesis and descriptive summary and lastly the development of the historical perspective with the taxonomy of measures or meanings [15].

The modification of this strategy added the validation of the conceptualisation through literature that was external to the materials used. This modification of the review methodology enabled flexibility with the search strategy as the conceptualization process necessitated identification of key conceptual papers that tend to explain why resilience has been viewed differently in different disciplines. Further, the addition of the validation phase enhanced the philosophical understanding of the process of conceptualization of resilience in each of these disciplines. In addition to this, following a non-deterministic literature search had given us the freedom to capture the historic evolution of the concept, simultaneously helping in the understanding of why there has been a shift in perception of the phenomenon from a "reductionist", "substance metaphysical", "narrow" and "deterministic" view to a "complex", "dynamic", "multidimensional", "intersectional" as well as a "systemic" view. Thus, the current approach utilized to identify the key research papers is based on a "purposive search strategy", with an aim to identify the most appropriate research papers that is assumed to help better understanding

of the conceptualization process of the phenomenon across disciplines and then facilitate its conceptualization in the context of public health. Through a rigorous iterative process, we attempt to synthesize a definition of resilience in the context of public health emergencies by refining and reflecting on our subjective perceptions of the phenomenon with the objective evaluation of the concept across multiple disciplines. The whole process of synthesis imbibes the diverse methodologies utilized to conceptualize resilience across disciplines and aims to derive a working definition that can be used to operationalize resilience for further research in the discipline of public health.

The modified integrated review approach had the following phases:

1. The Identification Phase- The phase consists of identifying key words or concepts that share similar semantic meaning with that of phenomenon of interest or the fundamental understanding of such key words or concepts that have an overlapping nature with that of phenomenon of interest.
2. The Exploration Phase-The phase is facilitated by the identification of key concepts that share similar meaning or whose fundamental understanding overlaps with that of phenomenon of interest. Combinations of such similar meaning concepts along with the phenomenon of interest are further utilized to explore the broader disciplinary orientation of the phenomenon of interest. Later, concepts or key words that repeat often with the phenomenon of interest are identified from the literature, and then are critically verified for emergence of patterns or themes that are directly related to such frequently occurring search terms or combination of search terms.
3. The Categorization Phase- The phase continues from critical examination of commonly emerging themes from the literature, till the emergence and categorization of such themes into specific categories. Also in this phase, the gap that emerges out of different categorizations of the phenomenon is critically examined, and to overcome such deficiencies - a model or an approach is identified or synthesized from the existing literature that can account for such gaps in conceptualization.
4. The Synthesis Phase-The categorization phase is followed by an iterative process, the critical examination for identifying the gaps in existing literature regarding the conceptualization enables the researcher to identify the deficiencies and strengths of different models or approaches that have been utilized to conceptualize the phenomenon of interest in their respective disciplines. And then this very

knowledge facilitates the process of synthesis that enables conceptualization of the phenomenon in its broad and narrow limits.

5. The Conceptualization Phase- In this phase further refinement of the concept is done after the researcher identifies its broad and narrow boundaries of conceptualization. This is the phase where the refinement process reaches its saturation point, and no further refinement is possible from the literature that has been reviewed for the study as well as the reflection from the subjective experience of the researchers about the concept. This enables the researcher to define the concept in the specific context.

6. The Validation Phase- Here further validation of the entire process of conceptualization is carried out using the existing theories or frameworks, where the components of the newly defined or synthesized concept is evaluated for convergence or divergence with the established theories or frameworks. This provides a systematic and philosophical basis for the entire process of conceptualization.

Results

The Modified Integrated Review of existing literature (1983–2021).

The identification phase

The phase, which started with the search for documents, utilized a broad search strategy including some additional terms along with resilience that were assumed to have some association with resilience while employing the search. The assumption emerged from the limited knowledge and experience gained from previous explorations. The initial search strategy employed in exploring resilience comprised of using terms like "Persistence", "Bounce Back", "Resistance", "Stability", "Equilibrium", "Adversity", "Crisis", "Self-Regulation", "Vulnerability", and "Homeostasis". This phase of literature search gave a broad idea of the concept of resilience, and also enabled navigation through multiple disciplines in the search for the meaning of resilience and to understand which of these meanings are shared across disciplines in the conceptualisation of 'resilience'.

The literature search progressed by categorizing research paper based on the level of enquiry in terms of whether the focus was at the micro or individual or family level, meso or group or community level and lastly the complex or systemic level where these levels interact to evolve a process of resilience in a system. In addition, these papers were also categorized by the disciplinary orientation that they fit into. This enabled the identification of the historical progress of the concept from a simple, static phenomenon to a complex, multi-dimensional construct. Each of these papers were again assessed for their convergence as well as divergence to the basic philosophy of public health, i.e., promoting and protecting the health of population, where both health as well as population are not understood within a cartesian reductionistic worldview, rather health preservation at the population level is considered as an emergent dynamic phenomenon. In the initial period of this inquiry, papers that were diverging from this basic philosophy of public health were identified, where resilience was conceptualized as a static phenomenon, where factors or pathways that result in resilient outcome follow a linear trajectory, and are always pre-determined. Papers that are converging to the basic public health philosophy were identified in the later stages of the search, where resilience is emerging as a result of systemic interaction from a dynamic context.

The exploration phase

The phase was facilitated by the identification of key concepts that share similar meaning or whose fundamental understanding overlapped with that of resilience. After that, combinations of such similar meaning concepts along with the phenomenon of interest were further utilized to explore the broader disciplinary orientation of the phenomenon of interest. The combined use of search terms such as "Vulnerability", "Risk", and "Resilience", guided the search towards "Disaster Management", "Organizational Behaviour", "Crisis Intervention", "Emergency Preparedness", "Sustainable Development", "Trauma and Recovery", and "Child Psychology". All of these domains suggested the presence of "deficiency" or "defencelessness" in an individual or system, for which the individual may either prevent, compensate or mitigate the associated risk to overcome the vulnerability that leads to optimal level of functioning. While the combination of terms "Adaptation", "Transformation" and "Resilience" guided the search pathway to "Socio-Ecological Systems", "Developmental Psychology", "Disaster Mitigation and Preparedness", "Complex Adaptive Systems", "Public Health Emergency Preparedness", which in addition to risk and vulnerability, also focussed on strength, capacity, growth and development. Here the emphasis was not just given to the individual or system's ability to maintain stable functioning after a crisis, but also to learn from the effective management of the crisis and use that knowledge for the individual's or system's growth and development.

The categorization phase

The phase continued from critical examination of identified commonly emerging themes from the literature, till the emergence and categorization of such themes into specific categories. From each of the disciplines

mentioned above one could identify forty studies that were relevant to resilience, and from these we discern a pattern where resilience was defined and operationalized at different levels, including the micro, macro and systemic levels. The micro level studies tried exploring resilience at individual and group level, while the macro level at organization or community level and the systemic view of resilience looked at the phenomenon as an interaction between these levels. Out of the forty studies fourteen studies belonged to micro level, eight studies belonged to macro level and the rest of them viewed resilience as emerging from systemic interaction.

The categorization of the studies was not done prior to the search, but the categorization emerged as a pattern from the search strategy. The search was carried out using Google, Google Scholar, and in PubMed, in pub med along with the term resilience the Boolean operator "OR" was used to get all the studies that contained all the combination of terms, "AND" was used to get individual studies, and truncation with wild card (*) was carried out to get phrases or words associated with resilience.

All the forty studies that were used for the critical review have been listed in a table along with the references. The data has been uploaded into the web and the link has been shared in the footnotes[1]. The following figure briefly demonstrates the phases of the search and the findings that emerged in each phase. The search comprised of three phases, which have been categorized into "Identification phase", "Exploration Phase" and the "Categorization Phase". These phases are chronologically arranged, and demonstrate how the search initially began with a broad understanding of the concept, then gradually narrowed into the identification of two different generalizations of the concept, as the search progressed. The flow chart elaborating the steps involved in the categorization phase is given in Fig. 1.

The synthesis phase

The categorization phase further follows an iterative process, the critical examination for identifying the gaps in existing literature regarding the conceptualization enables the researcher to identify the deficiencies and strengths of different models or approaches that have been utilized to conceptualize the phenomenon of interest in their respective disciplines. And then this very knowledge facilitates the process of synthesis that enables conceptualization of the phenomenon in its broad and narrow limits. During this phase the notion of resilience expanded from a "Substance Metaphysical", "Reductionist" phenomenon to a broader "Multi-Dimensional", "Intersectional and a "Dynamic phenomenon".

The figure given below is a representation of the same, explaining how the view and scope of the phenomenon became broader and broader, accommodating more diverse elements involved in explaining the phenomenon within its narrow and broad limits. Assuming that crisis is perceived as generalised and a common stimulant that would trigger resilience was the latent idea or an imprecise grasp of the phenomenon in the early stages of the exploration. The assumption was that resilience would only operate in people or systems that had specific innate qualities. This static view of the phenomenon which utilized a "reductionist approach" tends to limit the experiences of individual or system as a single dimensional and linear process. Through a thorough review of the literature, the understanding that people actually occupy a position that is in dynamic interaction with both their internal and exterior environments, and that their intrinsic characteristics are also subject to fluctuations because of contextual variances emerged. This enabled expansion of the view of the phenomenon from having a "substance" or "static" understanding to a dynamic one. The dynamic nature of the phenomenon further prompted an investigation into why a person or group might take on a dynamic position in the face of a crisis. Does the fact that an individual or system cannot be totally separated from the environment or culture to which they belong affect how that person or community would react in a crisis? This prompted broadening the scope even more after learning that the phenomena could be experienced in layers and that there is a component of interconnectedness that contributes to such experiences. The notion of interconnectedness guided the inquiry towards an intersectional view of the phenomenon, which could be simply understood as an intersection of experiences of an event at the community or at a larger level, where the experiences tend to cascade and then compound to the individual or group level. These compounding of deficiencies give rise to unique experiences of a crisis when the context gets dynamic. And the individual or group responses to such events will be diverse depending on the dynamic position held by them, resulting in diverse outcomes. Now, the factors that enabled a given system or person to choose a pathway that led to a favourable outcome may not help in attaining the same, if the situation is different. Similar to this, a pathway that allowed for a favourable outcome in one situation might not allow the system to reach the same outcome in another, indicating that dynamic interactions of components through non-linear pathways may lead to a variety of outcomes.

The various models, frame works and theories on resilience have been assessed for understanding the historical evolution of the concept. The assessment of its trajectory of evolution itself is achieved through the process of integration between such overlapping models or framework

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[1] https://docs.google.com/spreadsheets/d/1ZYu6TwQ7B9sMR4rjGuHiJjpqw5KD-mBJAlVFTph-xhQ/edit?usp=sharing.

- Terms identified with the help of prior Knowledge base and experience
- Terms assumed to have some association with resilience
- Search lead to multiple domains and disciplines where 40 studies related to resilience were identified

Identification Phase

- Exploration for any similar patterns emerging from theses studies
- Combination of Search Words Were Used like "Vulerability" "Risk" and "Resilence" or "Adaptation", "Transformation" and "Resilience" or "Resistance", "Recovery" or "Resilience

Exploration Phase

- Two forms of pattern emerged from the search
- Pattern which categorized resilience on the basis of its nature- Negative Nature(Deficient Model) and Positive Nature (Strength Model)
- Pattern that categorized resilience on the basis of levels at which it has been defined,
- Micro, Macro and Systemic Levels

Categorization Phase

Fig. 1 The process of categorization

on resilience. Models or theories that explained resilience at the individual level were mostly concerned with the static or fixed qualities of an individual who are determined to achieve resilience in any context. Meanwhile, models or frameworks which considered individuals as part of their surrounding environment or to a much larger group or community, explained resilience as an outcome that emerges from their dynamic interaction. Moving to the systemic understanding of the concept, the theories and frameworks, started identifying resilience as a process rather as an approach or an outcome. Critically evaluating each of these models and frameworks, by going through multiple iteration, gave the authors the opportunity to integrate many of the relevant discussions from each of these models for weaving together the popular discourse in which the concept of resilience has evolved over the years in different disciplines.

The conceptualization phase

In this phase further refinement of the concept is done after identifying the broad and narrow boundaries of conceptualization. This is the phase where the refinement process reaches its saturation point, and no further refinement is possible from the literature that has been reviewed for the study as well as the reflection from the subjective experience of the researchers about the concept. A question that remained unanswered during the synthesis phase of the review process with regard to resilience was whether the phenomenon was caused by a crisis or whether it was the manifestation of a phase of a crisis. In an attempt to answer the former question, we came across the notion of the feedback loop mechanism which is found in systems or individuals when they are exposed to crisis of acute or enduring nature and who successfully place themselves in enabling trajectories of adaptation as a response to such crisis. On meeting with a crisis or perturbation that exerts a minimal challenge on the existing capacities of the system, it tends to resist or absorb its impact by utilizing the existing or slack resources, this process is facilitated by a negative feedback loop mechanism, moving the system towards a stable trajectory. This process follows a cyclic trend and the individual or system is consistently exposed to acute perturbations. Now, when the crisis' impact poses a significant challenge to the system's current capabilities or functioning, the system may need to investigate potential pathways for adapting to such situations, either by strengthening current capacities or using the available capabilities to develop advanced capability for adaptation. The process is facilitated by a positive feedback loop mechanism. It amplifies efforts of the system or individual that results in enduring changes in the fundamental structure and function of the system. This will then form the basis for growth and transformation in the future. This process follows a spiral trend, keeping and moving the system towards trajectories of growth and transformation. This notion that came out of the inquiry on crisis and its management, provided the idea that resilience is a continuous process that emerges out of persistent engagement with the crisis of acute or enduring nature. Thus, suggesting that it just doesn't emerge out of an interaction with the crisis or represents a phase of adaptation to crisis, rather it is a continuous process of successful engagement with the crisis and its resolution. Such an understanding of the phenomenon moved us to its broader limits where it could be defined and operationalized for public health. A diagrammatic illustration of both synthesis and conceptualization phase has been given in Fig. 2.

The validation phase

The whole process of synthesis and conceptualization phase broadened our philosophical understanding of the various approaches that have been utilized in different disciplines to conceptualize resilience. And the understanding that emerged while conceptualizing resilience in the context of public health suggested "Resilience" as a concept having "complex" and dynamic nature, a continuous occurring process that is enabled by "successful engagement" with the crisis, facilitated by "interconnectedness" and "integrated response" from "multiple factors across various layers" that leads to "diverse outcome". This very understanding led the authors to search for philosophies that could accommodate complex and dynamic nature of resilience. For this we chose "Stanford Encyclopaedia of Philosophy" to identify philosophies that converged or diverged with such understanding of the phenomenon that had emerged during the review process. By using only one key word, "resilience" in the search options we identified 10 documents by reading through the first three lines of the document, which identified resilience either as a property of individuals or groups of individuals or as a process that individuals/groups go through. There were seven documents identified on July 1 2022. We re-identified these documents using the same search word on March 17 2023 and found 38 documents from within the SEP. Using the same criteria for selection, the same seven papers emerged for validation. As Resilience from that particular perspective would be a "discrete outcome", that follows a "fixed mechanism" based on a "deterministic and universal approach" and there is "certainty" of repeating similar outcome even if the context is dynamic. With such an understanding about the diverging perspective from the current approach of conceptualization of resilience in the context of public health, we could identify two papers that had few of these divergent aspects. All the 7 papers have been elaborated in a separate section of this paper, where categorization has been done on the basis of convergence or divergence of philosophical perspectives given in each paper with that of conceptualization process of the phenomenon of resilience in the context of public health.

The definition

Resilience in the context of public health emergencies is "*A process that individual or systems undergo which is continuous and integrated, emerges out of successful engagement with acute or enduring crisis and results in trajectories that enable sustenance, growth and transformation*".

Validating the definition

As discussed in the methodology section of this paper, we had identified seven philosophical concepts and/or
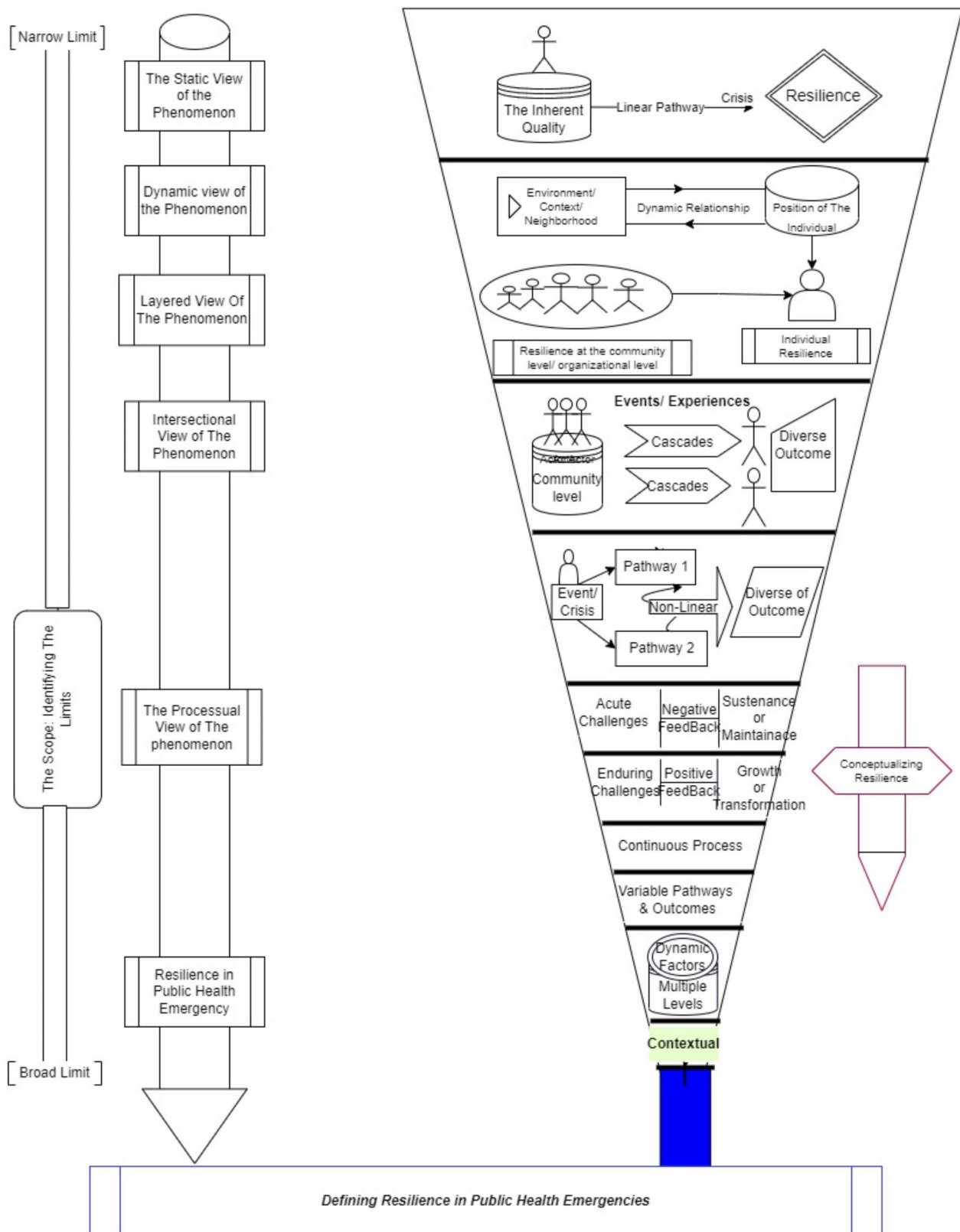
Fig. 2 Pictorial demonstration of the iterative process of synthesis and conceptualization phases of modified integrated review

theories that enable validation of the definition so arrived on resilience for public health emergencies. The tables shared below explain those philosophical concepts/ theories and their key components that converge (see Table 1) or diverge (see Table 2) with the definition of resilience in the context of public health emergencies.

Discussion

The objective of the paper is to conceptualise resilience in the context of public health by understanding how it has been defined across various disciplines. Initially the terms that were known from prior field experiences of the unprecedented floods of 2018 in Kerala were used as a pathway to obtain a broad idea of resilience. This phase was used to explore the scope of resilience and to identify how widely it has been studied among other disciplines and in public health. In this phase, Forty publications that included online articles and books, all related to resilience were identified. The search operations were mostly done online, and carried out using Google, Google Scholar and PubMed. Following this, two patterns from the literature started to emerge. The first one was one in which resilience develops as a result of a negative or positive feedback loop mechanism. This is caused by the acute or chronic impact of a crisis, respectively, and leads to the achievement of stability or transformation and growth.

When resilience emerges out of negative feed-back loop due to a shock of acute nature, then the outcome is manifested as stability or equilibrium. And when it emerges out of positive feed-back loop that is originated by the enduring adaptive process to the crisis, then the outcome is manifested as positive adaptation or transformation. This contrast, which is observed in various studies in the literature, shows that resilience cannot be understood by simply following any of these single trajectories because the outcome, process, and elements that are related to it are complex and varied in nature. Growth and transformation can occur even in the absence of a crisis, and feed-back mechanisms may be present as part of the system's normal functioning. Therefore, conceptualising resilience by looking at just one consequence, trajectory, or factor may not be helpful.

Conceptualization of resilience at various levels was another pattern discovered as the literature search progressed. This literature indicates that resilience can manifest at the micro, macro, or systemic levels. At the micro level, the emphasis is on individual and groups of individuals and the development of resilience in them. When resilience is studied among communities, organizations or in various cultures the assessment is at the macro-level. Then the systemic view of the phenomenon considered resilience as a complex property that emerges from dynamic interactions among factors across multiple

levels. The emergence of such patterns from the literature survey underscores the importance of accommodating the complexity and the diversity of conceptualization of resilience in research.

The public health system is considered an open, interconnected system where multiple feedback loops exist among various sectors connecting and communicating strategies concerned with health preservation. Public health along with primary health care is an essential component of a sustainable health care system [24] that has its primary objective rooted in research, prevention of diseases and promotion of health and wellness in the community [25]. Public health's involvement as an agency in promoting health and preventing health related risk in the community enables the community to foster its resilience [25]. The community's participation and their involvement in analysis of local health risks and their mitigation can enable health systems to use the community's own experience and knowledge in planning and designing emergency preparedness programs. This can improve a health system's response to adversities and overall resilience of the public health systems [26]. The day-to-day functioning of a health care system is further influenced by the dynamic decisions and actions of the key agents or actors within the system. Their actions may also interact with functions of various other systems that are also concerned with health preservation which then again may have an influence on building resilient health systems and communities. In addition to this the factors that impact the health of the individual or community are found in places outside the health system, thus activities of health preservation are just not limited in the hands of community or the health system alone. Therefore, any adverse event that shifts or disrupts the steady trajectory of any of these interconnected systems can result in acute or chronic deficiencies that impair the health system's or community's ability to sustain or preserve individual health.

As a result, in order for communities and health systems to be resilient, the crisis may necessitate an integrated response involving all essential stakeholders working to preserve individual and community health. Resilience in public health results from the coordinated efforts of many stakeholders, which is a continuous process with the main goal of sustaining and preserving people's health and quality of life. Therefore, the definition of resilience in the context of public health should take into account its complexities and multidimensionality.

Conclusions

The process of conceptualising resilience in the discipline of public health has been aided by its overlapping nature, which allows it to act as a " boundary object" across multiple disciplines. Among the disciplines that were

Table 1 Conceptualisations/theories whose components converge with the process of arriving at the definition for resilience in the context of public health emergencies

SEP on Resilience	Theoretical components	Key elements that converge
Process Philosophy [27]	• Dynamic view of the reality • Dynamic sense of being as becoming • An integrated and holistic approach that unifies both "Occurrence" and "occurring" • Continuous - circular and dynamic dependencies that are occurring in the occurrence of the phenomenon	• Self-Maintaining • Self-regulating • Emerging • Continuous • Dynamic Position • Diversity and Complexity
Critical Disability theory [28]	• Paradigm that scrutinizes a phenomenon through diverse set of approaches • Interdisciplinary as well as historical evaluation of the phenomenon • Its own work is embedded in time and space	• The methodology utilized to arrive at the definition • The expansion of understanding of notions of resilience from a "Substance Metaphysical", "Reductionist" phenomenon to a broader intersectional, integrated, multi-dimensional and continuous phenomenon
Bio-Diversity [29]	• Intergenerational Justice • Bio-Diversity–having insurance and optional value • Preserving or sustaining diversity keeps diverse option alive for the future • Contributes to Resilience	• Normative Dimension- the goal is to maintain or create avenues that are valuable to future generations • Diversity ensures multiple avenues for achieving a valued outcome
Ecology [30]	• Complex systems tend to exhibit emergent properties • Relationship between diversity and stability • Resists reductionist explanations	• Intersectionality • Causation at population level cannot be attributed to the Individual level • Diverse ecosystems have more optional value, tend to maintain stable trajectories
Global Justice [31]	• Dynamic position of the individual, community or a country • Intrinsic worth of a community or individual that justifies the right to sustain and grow	• Moral dimension to resilience • Why one must sustain, overcome or grow from a crisis • Normative dimension as the trajectories in resilience favours a valued outcome that enables sustenance growth and transformation

explored, we could identify few commonalities by which various authors have tried defining resilience. In the initial development, the concept of resilience was identified as something that could be achieved as an alternative to deficiency. Then as review progressed and involved multiple disciplines, researchers started identifying resilience as a desirable quality in any individual or system, even in the absence of a deficiency. Later when the concept's popularity had gained the attention of several other disciplines, researchers started identifying resilience as a product of interaction of the individual's inherent qualities and the present deficiencies in the environment.

This notion was further supported by the fact that the presence or absence of a factor could influence how an individual or system becomes resilient in the presence of a deficiency within its environment. Further reading enabled us to identify resilience as a quality that emerges as an interaction between present deficiencies and the inherent qualities (that are dynamic and subject to change) intended to overcome the impacts of a crisis.

Later during the progress of inquiry, we identified the notion of resilience as something that emerges out of successful engagement of individuals or system with past deficiencies, that motivates them to address the present deficiencies through a well-established feedback mechanism. Further examination of recent developments about the concept in various disciplines, has facilitated the conceptualization of resilience to be something that is a continuous process and happens across multiple layers. This can either help in balancing the persisting inequalities or build the system to develop capacities with potential to address deficiencies that could arise in future.

As a result of all of these reflections from the critical examination of the existing literature, we developed a working definition of resilience in the context of public health. The working definition may be useful for operationalizing resilience in the context of public health emergencies and may contribute significantly to future research in the area of resilience and public health emergencies.

Limitations and Future directions.

The study could have captured the more complex mechanism by which the phenomenon of resilience emerges in a dynamic system. Dwelling on the conceptual understanding of "self-organization" or "emergence" would have given a more comprehensive understanding of how resilience may emerge in a dynamic system that is operating far from the equilibrium state. These concepts are primarily seen as hall mark of all living systems, including social systems when they tend to reorganize themselves while continuously engaging with any internal or external crisis or deficiency. Now this could be some important trajectory to follow for conducting research in the field of public health especially in the area of resilience and public health, as the world now faces crises which have the potential to impact globally, like the most recent global health emergency of the pandemic outbreak or a much lasting crisis of climate change. Both of these crises demonstrate the increasing need to focus public health research in the area of resilience and public health emergencies.

Table 2 Conceptualisations/Theories whose components diverge with the process of arriving at the definition for resilience in the context of public health emergencies

SEP on Resilience	Theoretical components	Key elements that diverge
Nietzsche's Moral and Political Philosophy [32]	• Excludes the option to self-regulate, as individual is not held responsible for his/her action- Causa Sui • Believes in solitary or working in silos and in uniformity that has linear and specialist approach • The individual is in a "Instrumental "relationship with others and the surrounding environment • Considers suffering as a prerequisite for growth • Determinism	• It is inconsiderate of change, dynamic context and learning from adverse experiences(presence of a feedback mechanism) • Excludes dynamic interaction that the individual is in with the environment • Crisis as the only catalyst for growth- Linear pathway • Structure or capacity that are external to an individual will influence the course of events • Individual is seen as separate from the contextual influence
Functionalism [33]	• Emphasis on the instrumental value–the function or the role it plays • Excludes optional as well as insurance value • Function as a response to stimulus • Focuses on the uniformity of action and commonality of function- reductionist approach • Determinism	• Generalization of causation • The aim is to achieve Functional Similarity • Fails to capture contextual and individual differences that may result in diverse outcome for similar stimulus • Plurality

Data availability
All data generated or analysed during this study are included in this article [and its supplementary information files].

Declarations

Ethics approval and consent to participate
This is not applicable for the study as there were no empirical data collected for the study.

Consent for publication
Not applicable.

Competing interest
There was no competing interest for the study.

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