COMPARTMENTAL PROSPECTS FOR COMMUNITY RESILIENCE DURING THE COVID-19 PANDEMIC: THE CASE STUDY OF PAKISTAN

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Abstract

The paper examines the origins and dynamics of community resilience in Pakistan. There was a substantial reduction in COVID-19 infection and mortality relative to the country average. These two views combine to form the analytical framework. First, resilience in socio-ecological systems emphasizes adaptive processes including both prior knowledge and new knowledge. This paradigm illustrates how a cultural milieu, an aggregate product, and a selecting environment work together to embed the acquisition and continuation of interlocking behavioral contingencies. To explore how the community self-organized throughout this time period, researchers used a mix of descriptive and exploratory qualitative research methodologies. During the epidemic in Pakistan, prior experience with societal difficulties aided self-organization and the creation of creative methods. Interviews also revealed positive feedback loops at the community level that aided the creation of new practices. This study attempts to improve community resilience by analyzing geographic, psychological, and ecological aspects (contextual variables).

Keywords: Community Resilience, COVID-19, socio-ecology, behavioral contingent

1. INTRODUCTION

Much of the discussion about the effectiveness of COVID-19 response has focused on the impact of public policies adopted worldwide by various governments. Such interventions range from extremely restrictive measures to social distance, closing most public spaces to being rather flexible as mentioned by Cohen & Kupferschmidt (2020). The study conducted by Axelrod & Cohen, M.D, (2000) however, demonstrates the importance of understanding the decentralized emergence of practices and behaviors. As Corburn, Vlahov, Mberu, et. al. (2020), Mamelund (2017), Tampe (2020) claims that low-income social groups are more vulnerable to pandemic risks. The lack of basic needs such as water drainage and waste collection put people in a particularly vulnerable position in slums and in urban informal settlements.

After the media claims of a COVID-19 outbreak were reported to members of the Pakistani community, the resident association began to mobilise its existing organized processes to cope with the possible repercussions of the pandemic for the community. The Government has formed a decentralised army of 840,000 volunteers called the "Tiger force," each responsible for monitoring the COVID-19 situation. The street presidents also disseminated information on basic care, fought the spread of false news and identified possible cases early. The study conducted by Malot, Glenn (2019), Borba (2019), Couto, Lorenzo, et. al. (2020) claims that the metacontingency technique has been successful in analyzing various socially difficult systems, such as

common community administration of a lake and a community of Acai berry extractives. Although vaccinations in most countries are still not widely accessible, public actions to limit the spread of the virus still largely consist of interventions for behaviors such as social distance and the application of masks in public areas. A behavioral analytical approach to the problems of the pandemic is therefore essential. Most behavior analytic studies addressing the COVID-19 pandemic have so far had an intrinsic conceptual character, highlighting the importance of metacontingencies. For instance, the study by Tibério et al. (2020) discuss characteristics that explain behaviors like social distance mask use and hand washing. In order to support self-control and social collaboration Camargo & Calixto (2020) propose non-coercive behavioral methods. Amorim et al. (2020) have a cultural/competent perspective to examine actions taken by the São Paulo State to promote social distance. The literature analysis does however indicate that no study has so far coupled a behavioral analytical method with the ideas of complex science in order to address resilience and the development of new behavior patterns in the community during the COVID 19 pandemic.

The purpose of this paper is to provide a descriptive examination of the creation of local knowledge and

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practices in Pakistan because of the COVID-19 outbreak. By integrating complexity sciences and behavior analysis to evaluate the Pakistan community as a socio-ecological and self-organized system, a selectionist viewpoint is employed to study cultural phenomena. Holland (1995) explains that complex systems are process-dependent organic-like entities characterized by feedback among multiple agents and scales, allowing system self-organization. The first section of this paper (Section 2) lays up a conceptual framework for describing the behaviors in Pakistan prior to the pandemic breakout, integrating the ideas of resilience from a complex system, Holland (1995) viewpoint and meta contingencies from behavior analysis. Thereafter, an interpretative study of how these practices changed as a result of the COVID-19 crisis is given. The cultural environment of Pakistan is then detailed (Section 4). The study methodology (Section 4) included a qualitative analysis of interviews with community members and leaders, as well as an interpretative examination of documents and media coverage. The ideas of resilience in socio-ecological systems, the interaction of diverse contextual elements (i.e., cultural milieu), and how the inhabitants structured their efforts and outcomes are explored (Section 6) in light of qualitative data from interviews (Section 5). More precisely, community resilience is explored by focusing on the creation and change of cultural practices in Pakistan because of the COVID-19 crisis (i.e., environmental perturbation).

2. COMMUNITY RESILIENCE: COMPLEX SYSTEMS AND METACONGENCIES

Community resilience has been studied in a variety of fields, including environmental science, engineering, social sciences, and economics. As a result of many environmental calamities, concepts linked to community resilience have emerged globally during the last thirty years. Currently, however, there is a lack of a comprehensive framework that incorporates interdisciplinary components of community resilience. Furthermore, as Koliou et al. (2018) point out, little study has been done on the intricate connections between the physical, social, and economic components of community resilience until recently. At present moment, there is no consensus on what constitutes community resilience, with the term overlapping with robustness, fault-tolerance, adaptability, survival, and agility. Cohen, et. al. (2013), Aldrich & Meyer (2015). Cohen et al. (2013) have also emphasized on the necessity of local authorities disseminating information in the event of an emergency. They discovered that information flow is critical for strategies aimed at improving community resilience. Cohen et al. (2017) proposed a community resilience assessment based on six factors: leadership, collective efficacy, preparation, place attachment, social trust, and social ties in prior research. Pfeffer Baum (2015) Compare and contrast several treatments aimed at improving community resilience, and end by emphasizing the significance of evaluation, action planning, and recognition of each community's uniqueness. Aldrich and Meyer (2015) discuss the role of social capital and networks in the context of disaster recovery. They argue that although investments in infra-structure are important, there is a fundamental need to develop robust ties across individual and societal levels.

Community Resilience and the COVID-19 Pandemic

It is feasible to see the formation of community resilience efforts in many different social situations. At the first stage of the pandemic, such initiatives generally attempted to help communities to adapt and sustain essential services in spite of the external difficulties. Fransen et al. (2020) provided review research that focused on the adaptation element of community resilience. The following component, which would include learning processes and future crisis preparedness, is not addressed in their research. The importance of informal and formal bottom-up channels in which community members and local leaders are the key actors was underlined in their study. In the context of the COVID-19 pandemic, many community resilience projects arise in low-income regions and frequently need tacit knowledge of specific target populations, past skillsets, existing organizational capacity, and webs of connection. Wu et al. (2021) looked at variables impacting community resilience in Wuhan, China, including social capital, economic capital, physical environment, demographic features, and institutional aspects. In this context, the authors identified economic level, vulnerability, and the built environment as the most important elements linked with community resilience.

The majority of community resilience research during the COVID-19 pandemic has so far concentrated on identifying variables that contribute to the establishment of community resilience. However, research that focus not just on the adaptive component of resilience, but also on behavioral learning processes and lessons learned at the community level from a temporal and hence evolutionary perspective are needed. In this regard, the framework of complex systems and meta contingencies proposed here contributes.

Complex Systems and Meta contingencies

Understanding complex and multidimensional social phenomena, such as the dynamics of socio-ecological systems, frequently necessitates a multidisciplinary approach that incorporates conceptual tools from several fields of study. As a result of feed-back, a complexity sciences interpretation would focus on how adaptive systems (units of analysis) arrange agents in an evolving structure, create aggregate behavior, and predict environmental changes. According to Holland (1992), Complex adaptive systems have three key characteristics: evolution, collective behavior, and anticipation. The ability of an agent to learn is typically seen, but so is the adaptation that occurs in the context of social interactions. Beyond the context of emergencies or environmental disturbances, this emergent characteristic can be observed on a regular basis. For example, Residents in Pakistan have created groups in reaction to a lack of government investment in, among other things, education, health, and sanitation. As a consequence, the residents' association is a social system of organizations that originated from and were inspired by the historical requirement to solve social problems. This social structure may also act as a platform for future issues adaptation. Aggregate behavior is essentially emergent, which means it can only be properly

grasped by looking at the components in relation to one another. The aggregate behavior arising from the coordinated efforts among the people of Pakistan is the outcome for the community, such as employment generation and access to services within the community's geographical boundaries. Anticipation means that agents establish rules that predict the repercussions of particular responses. At the system level, an emerging capacity to foresee the implications of patterns of behavior and the reaction to specific environmental changes is seen. This continuous interplay between the agent's structure and reorganization as a result of environmental changes obeys a Darwinian-like evolutionary process. Interventions in complex systems generally attempt to understand and change aggregate behavior. However, complex systems are typically nested in ever-changing settings and may pose disturbances to social systems. This needs a capability to adapt to unforeseen occurrences, and it underlines the importance to comprehend resilience at the system level. Skinner, (1963) investigates that the field of behavior analysis has historically examined the evolutionary continuity in how organisms (unity of analysis) evaluate environmental signals and modify behavior as a function of outcomes. This functional connection between classes of behavior and environmental variables is defined as a contingency of reinforcement Frester & Skinner, (1959). Glenn, (1986) offered the first formal behavior analytic operationalization of interactions among organisms and their effects as a unity of analysis. She offers the metacontingency idea, which defines the functional connection between interlocking behavioral contingencies (IBCs), their aggregate result, and a choosing environment. IBCs take occur when the behavior of one organism acts as the context or as the con- sequence (i.e., feedback) of the activity of others. Such coordinated reactions have an aggregate product as a consequence. IBCs and their aggregate products are selected and maintained by a choosing environment. The idea of metacontingencies extends the functional terminology of behavior analysis to the cultural analysis of social systems. However, Houmanfar et al.'s (2010) introduction of cultural milieu completes the last link for the comparison between metacontingency and complex systems analysis. As in anticipation for Holland, the cultural milieu was referred to as the sets of circumstances and beliefs that enable a social system to foresee the probable consequences of IBCs (evolution) and aggregate products (aggregate behavior) (aggregate behavior).

From a complexity perspective, Pakistans' emerging cultural practices constitute a "inte- grated system of ecosystems and human society with reciprocal feedback and interdependence" Folke et al.'s (2010). Understanding these social dynamics' reciprocal interplay with historical and present environmental variables may elucidate the community reaction to the COVID-19 issue. The system's potential to "bounce back" from unanticipated occurrences and disruptions is generally characterized as resilience Folke, (2006). The Study of Wan & Rowling (2020) examines that resilience is an adaptive capacity to learn and re- arrange systems and the formation of new patterns of behavior. It is feasible to discuss resilience at multiple levels (i.e., organism and

system) and in different circumstances. Likewise, there are signs that successful actions at the community level are connected to prior experiences with preceding pandemics and attempts to confront environmental problems. In the instance of Pakistan, the residents' association played a significant role in defining the developing process and the engagement with internal and external players. As articulated by Folke, (2006) the resilience approach to socio-ecological systems stresses nonlinear dynamics, uncertainty, and the temporal interaction between periods of slow and fast change. Resilience at the community level is frequently connected to what Olsson et al. (2004) characterize as an adaptive governance framework and collaboration among stakeholders at diverse social and ecological scales. Formal processes coexist with emergent webs of interaction in adaptive governance, highlighting the need to: understand ecosystem dynamics; develop management practices that integrate knowledge from various actors in order to interpret and respond to ecosystem feedback and continuously learn; build adaptive capacity to deal with unexpected events; and sustain social networks in multiple settings. Cross-scale interaction is an important issue in the study of socio-ecological systems, which refers to a process operating on one temporal or spatial scale interacting with a process at another scale Peters, Bestelmeyer, & Turner, (2007). Duchek (2020) investigates that multiple threshold and regime shifts at various sizes co-exist, indicating that there are numerous conceivable future scenarios and reactions to external shocks. Bearing that in mind, it is necessary to shift beyond the normative and prescriptive character of much work on resilience in social systems. Therefore, rather than defining static aspects of community resilience, a process-based view on resilience stressing the fundamental characteristics of resilience as a system capability is recommended. In other words, resilience is regarded as a metacapability to foresee, cope, and adjust in response to unexpected occurrences rather than static qualities and behaviors.

The next part discusses the Pakistan community cultural environment. Section 5 shows how the community has repurposed its cultural traditions in order to adapt and bounce back from the obstacles caused by the COVID-19 issue.

3. SETTINGS: PAKISTAN CULTURAL ENVIRONMENT

This section elaborates on a behavioral perspective of system resilience by looking at the contextual variables at different levels (i.e., the clusters within the community and city as a whole), which helps to explain how the cultural practices as IBCs deal with the challenges posed by the pandemic outbreak. At the level of the individuals, the interplay of three environmental factors composes the sets of events that influence behavior— biological, anthropological, and psychological. The biological environment comprises of the fundamental foundations of life, such as availability to water, food, and shelter. The anthropological environment is generated by people and contains social contingency elements at several levels, such as ethnic, community, and national. Moreover, the psychological environment may contain both biological

and anthropological items assuming different functional qualities throughout the contact with other persons. As explained by Sánchez et al. (2019), human interactions in structured cultural groups may be viewed at as systems of IBCs that are impacted by common stimulus functions of events, objects, and individuals. As the authors define, stimulation functions are "properties of materials, resources, regulations, rules, traditions, institutions, technical development, art, other organized groups, competition, and persons that are shared by numerous individuals". Rather than being static configurations, sets of stimulus functions take place in dynamic networks of interactions and comprise components of the cultural milieu, which may modify the patterns of aggregate behavior in a socio-ecological system over time. The evolutionary nature of the cultural environment suggests that complex systems are characterized by an interaction between stability and change. As with metacontingencies, the individual competence to adapt to changes is impacted by norms or sets of contingencies that give the context (anticipation) and consequences to their conduct in relation to others (IBCs). When explained by Holland (1992), anticipation also takes occur at the aggregate level as complex systems build internal models to predict the future and the expectation of future situations.

The present study looked at the cultural environment of Pakistan and the contextual elements associated to the community response to the COVID-19 epidemic. The analysis consisted of the presenting of descriptive data linked to the cultural environment. The findings from the interviews illustrate the features, emphasis, and context of socio-ecological resilience in Pakistan.

4.   METHODS

As indicated by Amorim et al. (2020), macro and metacontingencies have been the unit of analysis of numerous interpretative researches. The understanding of the intricacy of the emergence of cultural events and linked behavior change at a large scale underlines the necessity of interpretative research focused on metacontingencies. Thus, this study contains two primary empirical dimensions. First, it offers the qualitative narratives of engagement in local practices obtained through interviews with four community members. In other words, the research methodologies offer the ingredients of a fundamental qualitative study Merriam, (2002), which includes examining the descriptions of cultural practices from the participants' perspectives and creating the opportunity for a conversation about learning and behavior modification linked to community resilience in Pakistan. The recognition of the complexity of real social settings characterized by an interplay of (often)-unexpected factors permeates the choice of qualitative approach.

Data Gathering

Conducting empirical research in the setting of the pandemic turned out to be in itself a tough undertaking since it was difficult to visit the community in order to obtain observational data on the activities and establish further contact with prospective informants. The data collection procedure may be separated in two stages: access to participants and conducting interviews.

Access to the Community and Participants

The researchers, who are based in a foreign nation, originally contacted the residents' organization in Pakistan, which subsequently enabled access to prospective informants who were contacted via e-mail and phone message. The group of informants was consisted of two persons in official leadership roles in the residents' organization (two men) and two street presidents (two females) (two females). The absence of direct observational data normally obtained in ethnographic research might be regarded as a drawback of this study. On one side, the data obtained from the qualitative interviews were triangulated with information accessible in other research papers and media coverage. The limited number of participants does not give statistical representativeness, and this might be viewed as a drawback of this study. Ideally speaking, it would have been better to interview more individuals and perform in loco observations. However, although it is not feasible to claim statistical generalization of the experience of the community members, the data give the chance to examine contextual elements associated to community resilience.

Interviews

The experiential and narrative perspectives of two persons in official leadership roles in the residents' association and two street presidents give insights on the formation of complex systems such as contextuality and temporality Tsoukas & Hatch (2001). The semi-structured interview guide (Appendix A) operationalized the notion of socio-ecological resilience, concentrating on the following three themes and deriving concepts provided by Folke (2006) (p. 259):

- Characteristics: Interplay, disturbance and recognition, sustaining and developing.

- Focus: adaptive capacity, transformability, learning and innovation.

- Context: integrated systems feedback and cross-scale dynamic feedback.

The objective here was two-fold: to study community resilience from a temporal viewpoint and identify the cultural milieu elements. The interview "plot" begins with the participants' initial encounter with the epidemic and knowledge that it would reach the community. The interviewer then addressed questions concerning the formation of various practices and learning at different levels, the feedback levels, and the possibilities for the retention of practices in a post-pandemic situation.

Analysis and Ethics

The interviews were transcribed and analyzed with the help of NVivo, which is a program that helps the study of qualitative data. Interviews used a theory-driven coding method, which implies codes came from the notion of socio- ecological resilience, as recommended by Folke (2006).   The data from interviews were originally classified according to the three general topics provided by Folke (2019). This is the stage where the three overall subjects of resilience were added in the project built on NVivo. The researchers then put codes inside each of the three categories, further operationalizing the idea of socio-

ecological resilience. The next analytical phase consisted of coding the data according to the ideas within each category (interplay disruption and rearrangement, maintaining and developing, adaptive capacity, transformability, learning and innovation, integrated systems feedback, and cross-scale dynamic feedback) (interplay disturbance and reorganization, sustaining and developing, adaptive capacity, transformability, learning and innovation, integrated systems feedback, and cross-scale dynamic feedback). Figure 1 illustrates the categories and codes hierarchy as put into NVivo and utilized to evaluate the qualitative data from interviews:

Name	Files	References
1. Interplay disturbance and reorganization, sustaining and developing	0	0
Context	2	3
Disturbance	4	4
Previous organization	2	4
Reorganization	3	5
2. Adaptive capacity, transformability, learning and innovation	0	0
Developing new practices	3	4
Learning	3	3
3. Integrated systems feedback, cross-scale dynamic feedbacks	0	0
Integrating new practices - future	3	7
Monitoring practices, sharing experiences	4	5

Figure 1 The analysis rationale with categories and codes (Extract from NVivo). Number of participants, and References = number of coded quotes from transcriptions

Section 5's three descriptive tables show this approach by giving statements from interviews that are particularly indicative of the qualitative results under each of the broad categories and codes within these.

The material given in earlier studies and media releases was primarily intended to comprehend and identify Pakistan's contextual elements, and it was classified using a theory-driven method based on three cultural milieu limits, as Kantor (1982) proposed. Different descriptions of adaptive processes in the community matched the features, focus, and context of resilience, as stated in the finding's presentation. The primary ethical problem in this investigation was maintaining the subjects' identity. The informants and other members of the community are not identified by their real names or personal information.

5. RESULTS

The qualitative findings from interviews are described here.

Characteristics: Interplay Disturbance and Reorganization, Sustaining and Developing

The respondents gave various stories of past experiences with social challenges, interaction disturbances and community restructuring. As reported by both leaders in the community, in February the early views of the pandemic and potential dangers to the community developed with news of the pandemics in Europe and Asia and estimates of thousands of fatalities in Pakistan due to the small numbers of fans. At that time, experience of social problems and the many efforts that the association of residents had previously conducted led to first answers to the epidemic and reorganizations. In response to an apparent need to develop new leadership levels in the neighborhood and to strengthen engagement with citizens, the street president's movement was started. The resident association is a member of G 10, a national association of

Pakistan's ten largest favelas that distribute emerging policies to other communities. Table 1 shows the reports of four subcategories of results and interview passages, which were considered to be particularly representative.

Table 1 Interplay disturbance and reorganization, sustaining and developing

Codes	Interviews Excerpts
Context	Pakistan has always struggled due to the state's absence. If the wealthy population struggles with a limited supply of ventilators and the possible collapse of the health system, consider the individuals in our community who are unable to follow the World Health Organization's guidelines. We have huge families crammed into tiny dwellings."
Previous organizations	"We never had a pandemic before, but we have eighty years of experience in demanding wastewater and urbanization governmental policy. Pakistan has previously been recognized as a model for social initiatives and social enterprise.
Disturbance	"We had access to news and data on the very rapid transmission of the virus elsewhere. We began thinking about it before the virus came to neighboring nations"
Reorganization	"In collaboration with the G10, we have established a new management approach. We have already had programs such as the 'Corona Relief Fund' and the 'Corona Tiger Relief Force' focusing on the victims of violence and training. We were thinking about how to use it in the context of the pandemics and the economic crisis. Some volunteers began to make masks.

Focus: Adaptive Capacity, Transformability, Learning and Innovation

Although some of the first answers to the epidemic were channeling the existing activities into a new setting, the establishment of the movement of street presidents was creative. The street presidents played a key role as interfaces for communities and redirected actions on the fronts of health, the economy and health. The architectural structures of two schools that did not operate during the epidemic were employed to isolate affected people. The community's adaptive processes involved both the adjustment of the existing initiatives to cover the demands of the public in the context of the pandemic and the formation of street leaders, which allowed communication between the populace and the resident association's official structure. Table 2 shows the data relating to the community's adaptive potential.

Table 2 Adaptive capacity, transformability, learning and innovation.

Codes	Interviews Excerpts
New practices	"We built the social workers' movement and a chain of solidarity that people help one other. Each employee is accountable for ensuring that they stay home, provide donations and order medical assistance where necessary. Three fronts have been created: health, social, and medical"
Learning	I've learnt a lot about assisting and noticing the next person's needs. I thought I was living in poverty, but people are living in worse conditions. I lived in this community for ten years, but I hadn't seen so many stories during the pandemic. It's a nutshell experience.

Analysis of the descriptive results identifies resilience concepts in the instance of Pakistan, as suggested by Folke (2006). The findings show that existing routines are reoriented and new practices emerge during adaptation to a large environmental disorder. Although it was successful in the first two months of the pandemic, the rise in infection and mortality recorded in September 2020 concerns long-term adjustment questions in the context of uncoordinated state measures in Pakistan. The descriptive analysis of Pakistan provides crucial lessons to study socio-ecological resilience and policy-making contingencies.

6. DISCUSSION

A closer look at Pakistan's response to the COVID-19 problem reveals key elements of Holland's complex adaptive systems (1992). First, the ability of Pakistan's social structure to evolve in response to environmental changes was described. Second, we saw the creation of aggregate behavior from local contacts, such as reorienting established practices and the emergence of street presidents. Similarly, the respondents addressed the anticipated effects of the pandemic on local communities and individual behavior. The community response to the unique coronavirus pandemic demonstrated self-organization due to prior social obstacles and the formation of a new web of relationships in the shape of street presidents. Like past effective community responses, this one involved combining prior knowledge with the study of new possibilities. Thus, the durability of new practices was self-organizing.

Duchek (2020) analyzed the resilience of community as a system capability and underlined the relevance of feedback loops, which either intensify or limit emergent changes. The past existence of open channels of communication between community leaders and residents encouraged conversation on challenges and resource distribution. While no formal evaluation of the activities of street presidents and other initiatives was conducted, the residents' association's meetings provided the chance to observe practices.

Global news concerning the epidemic was the first cultural milieu alteration signaling that a new social organization was needed to deal with a probable crisis. The potential of increased unemployment and other difficulties associated to the epidemic served as contextual cues for the community's response. The community already has socio-interlocked behaviors including the community café, seamstress association, and residents' association. Others were born to meet the pandemic's demands. The citizens' association oversaw and implemented community services with the help of street presidents. The association slowed the infection's spread. In reaction to the pandemic threat, the community organization reorganized its operations to combat the virus's economic, social, and health repercussions. This is seen as system anticipation in complexity theory and as the cultural milieu in behavior analysis.

Public health policies can benefit from learning about resilience and innovative answers at the community level. The examination of the IBCs indicates a degree of inner cohesion and the acceptance of WHO recommendations reflected in the overall result. Maintaining such traditions depends in large measure, however, on how they are received in the selective context. In this respect, public health initiatives can be regarded as environmental selection interventions that can contribute to the continuity of successful cultural practices.

This study contributes to the study of community autonomous reactions to the pandemic as reported by Fransen et al (2020). It also underlines the importance of local knowledge and current organizational capabilities. The peculiarity of this study, however, is that an evolutionary conceptual framework is applied which highlights the temporal dynamics of learning, adapting and maintaining creative practices. Earlier studies on community resilience in the context of the COVID-19 pandemic described crisis adaptability, but not learning and consequences for future difficulties. This case analysis illustrates the continuation of prior experience and the creation of new behavioral patterns as several possible points of balance.

7. CONCLUSION

The strategies of governments in response to the problem of the COVID-19 have varied from severely tight social distance measures that close most public venues to more flexible ones. However, from the complex system perspective, the decentralized formation of community activities in response to the epidemic is equally crucial to consider. The fundamental contribution of this study is to give community resilience as a system capability a behavioral perspective. Applying the concept of the cultural environment to examine autonomous reactions in a complex system, a mosaic of contextual variables and the selection of community resilience factors has been outlined. Various public health interventions across the world aimed at curbing the spread of the virus and thereby controlling the pandemic. At the level of policy making, it is assumed that a pandemic control and a return to a sense of normality may be achieved. However, aiming for normality can limit the ability to learn, innovate and be prepared for future environmental disturbances at all costs. For socially vulnerable communities, like Pakistan, the issue appears not so much to be the return to prior norm, but the possibility of renewal and aggregate improved livelihoods. The scenario recounted here illustrates that the Community has an important aspect of system resilience and that good emerging practices at the policy level are recognizable and can even be maintained.

8. APPENDIX A. INTERVIEW GUIDE

Operationalizing categories form Folke (2002) (p. 259)

Characteristics: Interplay disturbance and recognition, sustaining and developing:

   i.   When was the moment that you became aware that the pandemic would reach Pakistan?

   ii.   What kind of previous organization facilitated new practices?

Focus: Adaptive capacity, transformability, learning and innovation:

   iii.   What you have learned during pandemic?

iv. How were the different strategies towards that containing the pandemic created?

v. How was the movement of Tiger Force created? How is your experience with this movement?

Context: Integrated systems feedback and cross scale dynamic feedback:

vi. How are results monitored?

vii. What challenges do you identify at this point?

viii. From your experience, what may be kept maintained from this period after pandemic?

ix. Is there anything you would like to add?

REFERENCES

[1] Cohen, J.; Kupferschmidt, K. Countries test tactics in 'war' against COVID-19. Science 2020, 367, 1287–1888.

[2] Axelrod, R.; Cohen, M.D. Harnessing Complexity; Basic Books: New York, NY, USA, 2000.

[3] Corburn, J.; Vlahov, D.; Mberu, B.; Riley, L.; Caiaffa, W.T.; Rashid, S.F.; Ko, A.; Patel, S.; Jukur, S.; Martinez-Herrera, E.; et al. Slum health: Arresting COVID-19 and improving well-being in urban informal settlements. J. Urban Health 2020, 97, 1–10.

[4] Scott, J.C. Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed; Yale University Press: New Haven, CT, USA, 1998.

[5] Mamelund, S.-E. Social inequality—A forgotten factor in pandemic influenza preparedness. Tidsskr. Den Nor. Legeforening 2017, 137, 911–913.

[6] Tampe, T. Potential impacts of COVID-19 in urban slums: Addressing challenges to protect the world's most vulnerable. Cities Health 2020.

[7] Instituto Pólis. Mortes Por Covid-19 Crescem 240% em Paraisópolis em Dois Meses. Available online: https://www.capitolio.com. br/noticias/2020/09/08/mortes-por-covid-19-em-paraisopolis-crescem-240-em-dois-meses/ (accessed on 10 October 2020).

[8] Malott, M.; Glenn, S. Targets of intervention in cultural and behavioral change. Behav. Soc. Issues 2019, 15, 31–57.

[9] Borba, A. The selection of different interlocked behavioral contingencies and maintenance of common pool resources: The case of the production of açaí berries. Behav. Soc. Issues 2019, 28, 229–247.

[10] Couto, K.; Lorenzo, F.; Tagliabue, M.; Henriques, M.; Lemos, R. Underlying principles of a Covid-19 behavioral vaccine for sustainable cultural change. Int. J. Env. Res. Public Health 2020, 17, 9066.

[11] Van Bavel, J.; Baicker, K.; Boggio, P.; Capraro, V.; Cichoka, A.; Cikara, M.; Crockett, M.; Crum, A.; Douglas, K.; Druckman, J.; et al. Using social and behavioral science to support Covid-19 pandemic response. Nat. Hum. Behav. 2020, 4, 460–471.

[12] Tibério, S.; Mizael, T.; Luiz, F.; Rocha, C.; Araújo, S.; dos Santos, A.; Terhoch, G.; Guarnieri, L.; Fonseca Júnior, A.; Hunziker, M. A natureza comportamental da pandemia de Covid-19. Rev. Bras. Análise Comp. 2020, 16, 57–70.

[13] Camargo, J.; Calixto, F. Combatendo a tragégia dos comuns: Como estratégias para autocontrole de cooperação social podem contribuir para o enfrentamento da pandemia de Covid-19. Rev. Bras. Análise Comp. 2020, 16, 71–83.

[14] Amorim, V.C.; Guimarães, T.M.M.; de Almeida, J.A.T.; Vanderlon, Y.; & Abdala, M. Promoção de isolamento social na pandemia de covid-19: Considerações de análise comportamental da cultural. Rev. Bras. Análise Comp. 2020, 16, 31–40.

[15] Carpenter, S.; Walker, B.; Anderies, J.M.; Abel, N. From metaphor to measurement: Resilience of what to what? Ecosystems 2001, 4, 765–781.

[16] Folke, C. Resilience: The emergence of a perspective for social–ecological systems analyses. Glob. Environ. Chang. 2006, 16, 253–267.

[17] Holland, J.H. Hidden Order How Adaptation Builds Complexity; Addison-Wesley: Reading, PA, USA, 1995.

[18] Houmanfar, R.; Rodrigues, N.J.; Ward, T.A. Emergence and metacontingency: Points of contact and departure. Behav. Soc. Issues 2010, 19, 53–78.

[19] Sandaker, I. A selectionist perspective on systemic and behavioral change in organizations. J. Organ. Behav. Manag. 2009, 29, 276–293.

[20] Sánchez, J.G.A.; Houmanfar, R.A.; Alavosius, M.P. A Descriptive Analysis of the Effects of Weather Disasters on Community Resilience. Behav. Soc. Issues 2019, 28, 298–315.

[21] Kaliou, M.; van de Lindt, J.; McAllister, T.; Ellingwood, B.; Dillard, M.; Cutler, H. State of the research in community resilience: Progress and challenges. Sustain. Resilient Infrastruct. 2018, 5, 131–151.

[22] Nguyen, H.; Akerkar, R. Modelling, measuring and visualizing community resilience: A systematic review. Sustainability 2020, 12, 7896.

[23] Cohen, O.; Leykin, D.; Lahad, M.; Goldberg, A.; Aharonson-Daniel, L. The conjoint of community resilience assessment measure as a baseline for profiling and predicting community resilience for emergencies. Technol. Forecast. Soc. Chang. 2013, 80, 1732–1741.

[24] Cohen, O.; Goldberg, A.; Lahad, M.; Aharonson-Daniel, L. Building resilience: The relationship between information provided by municipal authorities during emergency situations and community resilience. Technol. Forecast. Soc. Chang. 2017, 121, 119–125.

[25] Pfefferbaum, B.; Pfefferbaum, R.; Van Horn, R. Community resilience interventions: Participatory, assessment-based, action- oriented processes. Am. Behav. Sci. 2015, 59, 238–253.

[26] Houston, J. Boucing forward: Assessing advances in community resilience assessment, intervention, and theory to guide future work. Am. Behav. Sci. 2015, 59, 175–180.

[27] Aldrich, D.; Meyer, M. Social capital and community resilience. Am. Behav. Sci. 2015, 59, 254–269.

[28] Fransen, J.; Peralta, D.; Vanelli, F.; Edelenbos, J.; Olvera, B. The emergence of community resilience initiative during the Covid-19 pandemic: An international exploratory study. Eur. J. Dev. Res. 2020, 1–23.

[29] Xu, W.; Xiang, L.; Proverbs, D.; Xiong, S. The influence of Covid-19 on community resilience. Int. J. Environ. Res. Public Health 2021, 18, 88.

[30] Holland, J.H. Complex adaptive systems. Daedalus 1992, 121, 17–30.

[31] Skinner, B.F. Operant behavior. Am. Psychol. 1963, 18, 503–515.

[32] Ferster, C.B.; Skinner, B.F. Schedules of reinforcement. Am. J. Psychol. 1959, 72, 320.

[33] Glenn, S.S. Metacontingencies in walden two. Behav. Anal. Soc. Action 1986, 5, 2–8.

[34] Krispin, J. Positive feedback loops of metacontingencies: A new conceptualization of cultural-level selection. Behav. Soc. Issues 1997, 26, 95–110.

[35] Folke, C.; Carpenter, S.R.; Walker, B.; Scheffer, M.; Chapin, T.; Rockström, J. Resilience thinking: Integrating resilience, adaptability, and transformability. Ecol. Soc. 2010, 15, 20.

[36] Wan, K.M.; Ho, L.K.K.; Wong, N.W.; Chiu, A. Fighting COVID-19 in Hong Kong: The effects of community and social mobilization.

[37] World Dev. 2020, 134, 105055.

[38] Rowling, M. COVID-19: How Past Crises are Helping the World's Cities to Respond and Rebuild. Available online: https: //www.weforum.org/agenda/2020/05/cities-pandemic-coronavirus-covid19-health-response-response-rebuild/ (accessed on 10 July 2020).

[39] Holling, C.S. Resilience and stability of ecological systems. Annu. Rev. Ecol. Syst. 1973, 4, 1–23.

[40] Berkes, F. Environmental governance for the Anthropocene? Social-ecological systems, resilience, and collaborative learning. Sustainability 2017, 9, 1232.

[41] Olsson, P.; Folke, C.; Berkes, F. Adaptive comanagement for building resilience in social–ecological systems. Environ. Manag. 2004, 34, 75–90.

[42] Folke, C.; Hahn, T.; Olsson, P.; Norberg, J. Adaptive governance of social-ecological systems. Ann. Rev. Environ. Resour. 2005, 30, 441–473.

[43] Peters, D.P.; Bestelmeyer, B.T.; Turner, M.G. Cross–scale interactions and changing pattern–process relationships: Consequences for system dynamics. Ecosystems 2007, 10, 790–796.

[44] Levin, S.A. Ecosystems and the biosphere as complex adaptive systems. Ecosystems 1998, 1, 431–436.

[45] Heylighen, F. The science of self-organization and adaptivity. Encycl. Life Sup. Syst. 2001, 5, 253–280.

[46] Duchek, S. Organizational resilience: A capability-based conceptualization. Bus. Res. 2020, 13, 215–246.

[47] Kantor, J.R. Cultural Psychology, 1st ed.; Principia Press: Chicago, IL, USA, 1982.

[48] Center for Systems Science and Engineering—Johns Hopkins University. Coronavirus Resource Center. Available online: https://coronavirus.jhu.edu/map.html (accessed on 30 November 2020).

[49] IBGE. Grade Estatística e o Atlas Digital Brasil 1 Por 1. Available online: https://www.ibge.gov.br/geociencias/atlas/tematicos/24684-atlas-digital-brasil-1-por-1.html?=&t=downloads (accessed on 25 October 2020).

[50] Vieira, T. Paraisópolis. Available online: https://www.tucavieira.com.br/paraisopolis (accessed on 20 October 2020).

[51] Ajzenman, N.; Cavalcanti, T.; Da Mata, D. More than words: Leaders' speech and risky behavior during a pandemic. Soc. Sci. Res. Netw. 2020, 3582908.

[52] Roubaud, F.; Razafindrakoto, M.; Saboia, J.; Castilho, M.; Pero, V. The Municipios Facing COVID-19 in Brazil: Socioeconomic Vulnerabilities, Transmisssion Mechanisms and Public Policies (No. DT/2020/12). Available online: https://www.ie.ufrj.br/images/IE/TDS/2020/TD_IE_032_2020_ROUBAUD_et%20al.pdf (accessed on 20 November 2020).

[53] Cruz, C.H.D.B. Social distancing in São Paulo State: Demonstrating the reduction in cases using time series analysis of deaths due to COVID-19. Rev. Bras. Epidemiol. 2020, 23, e200056.

[54] State of São Paulo. Adesão ao Isolamento Social em São Paulo. Available online: https://www.saopaulo.sp.gov.br/coronavirus/isolamento/ (accessed on 20 November 2020).

[55] Merriam, S. Introduction to qualitative research. In Qualitative Research in Practice. Examples for Discussion and Analysis, 1st ed.; Merriam, S.B., Ed.; Jossey-Bass: San Francisco, CA, USA, 2002; pp. 3–17.

[56] de Carvalho, L.C.; Sandaker, I.; Ree, G. An ethnographic study of tagging cultures. Behav. Soc. Issues 2017, 26, 67–94.

[57] Tsoukas, H.; Hatch, M.J. Complex thinking, complex practice: The case for a narrative

approach to organizational complexity. Hum. Relat. 2001, 54, 979–1013.

[58] Gibbs, G.R. Qualitative Data Analysis: Explorations with NVivo, 1st ed.; Open University: Philadelphia, PA, USA, 2002.

[59] Norman, J.; Bar-Yam, Y.; Taleb, N.N. Systemic Risk of Pandemic via Novel Pathogens—Coronavirus: A Note. New England Complex Systems Institute. Available online: https://necsi.edu/systemic-risk-of-pandemic-via-novel-pathogens-coronavirus-a- note (accessed on 7 December 2020).