Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i3.4565

CHILD AND MATERNAL MALNUTRITION IN THE POST-MDG ERA – QUALITATIVE ANALYSIS OF CHALLENGES AND POSSIBLE WAY-OUT: A SOCIAL NETWORK ANALYSIS OF POPULATION THERAPEUTIC STRATEGIES

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ABSTRACT

Child and maternal malnutrition is a major population health problem of Pakistan. After millennium development goals (MDG), the sustainable development goals (SDG) is an effective strategy to address malnutrition in a more collaborative manner. The recent Covid-19 pandemic has badly affected SDGs efforts. Data on the effects of Covid-19 on implementation of nutrition SDGs - an extension of the MDGs, is scarce. Therefore, the present study investigated the challenges posed by Covid-19 and the priority actions needed to cope with these challenges. The study utilized mixed methodology that included review of published official documents and interviews of the relevant stakeholders. Data was collected in a questionnaire on questions related to the effects of Covid-19 on nutrition SDGs. The social network analysis was performed to derive key themes from the qualitative data obtained from the respondents. Gephi 0.10.1 software package was used for data analysis and visualization. The results show responded perceived 'funds distribution', 'social mobilization', 'charity mobilization', 'innovation in research', 'education/awareness', 'capacity building' and 'budget curtailing' as the main challenges posed by Covid-19 to child and maternal nutrition. In response what can be done to address these challenges, responded suggested these: 'nutrition-sensitive strategies', devolution of power', 'political stability', strong nutrition surveillance system', 'multi-sectoral approach', 'controlling food costs', 'nutrition governance', 'stronger monitoring/evaluation strategies' etc. In conclusion, Covid-19 has badly and negatively affected nutrition SDGs and there is an urgent call for more integrated and collaborative efforts to successfully conclude the SDGs agenda by 2030.

Keywords: population health, child and maternal nutrition, MDGs, SDGs, Covid-19, Pakistan

INTRODUCTION

Innovative population therapeutic strategies are becoming common for addressing malnutrition issues - a common health problem of developing world including Pakistan. In particular, the most vulnerable groups for malnutrition are children and mothers. Pakistan was distinguished as one of the seven nations that represented around 33% of the world's undernourished populace [1]. Numerous countries in the time of the Millenium Development Goals (MDGs) era (2000-2015) prevailed with regards to decreasing the pace of child and maternal undernutrition, however there was lopsided improvement. Most of Asian nations saw sensational decreases, yet progress in Pakistan was less uplifting, and the general number of hindered kids expanded because of populace extension. Globally, this improvement hit a wall about 2014 and is currently regressing, as noted by the State of Food Security and Nutrition in the World 2019 [2].

Like most of the developing countries, Pakistan didn't perform well in achieving the nutrition goals and targets set by the MDGs, in general, and those related to nutrition for children and mothers, in particular [3]. Numerous factors contributed to this failure. One more issue that firmly connected with the post-MDGs time and the change from MDG to SDG (Sustainable Development Goals) is the rise of Covid-19 pandemic. At the point when the 'Agenda 2030' was planned and sent off in 2015, the basic worldwide situation was altogether unique in relation to the present time. The continuous Covid19 pandemic, arose in China toward the end of 2019 and quickly spread across the globe, delivered sensational results on social, economic, and environmental development of numerous nations [4]. Such impacts, thus, may not just genuinely subvert the future accomplishment of the SDGs yet in addition put in danger the majority of the new advancement towards them as well as the past headway made somewhere in the range of 2000 and 2015 towards the MDGs objectives. The SDGs activities have been badly affected by Covid-19 [5]. Considering that the Covid-19 is a complex peculiarity with numerous political, economic and social outcomes, stakeholders with various interests/power and political motivations can assume a significant part in taking care of population health. Stakeholder analysis as a systematic tool assists policymakers in identifying, categorizing and analyzing stakeholders/ actors that can be influenced by a proposed action [6].

The success of the SDGs is predicated on multisectoral collaboration, and the Covid-19 pandemic makes it even more urgent to learn how this can be done better [7]. Complex challenges facing countries, such as Covid-19, cut across health, education, environment, financial and other sectors. Addressing these challenges requires the range of responsible sectors and intersecting services – across health, education, social and financial protection, economic development, law enforcement, among others – transform the way they work together towards shared goals. The main goal of this study is to analyze the policymakers' perception of the effects of pandemics (such as Covid-19) on the progress of public health projects. Hence the primary purpose of this study was to identify characteristics of various stakeholder groups as they related to child and maternal nutrition during the MDGs era and to us the lesson learned for better planning of SDGs implementation. To the best of our knowledge, there has been no previous data available on stakeholders' analysis. We anticipate that this study's findings will inform our understanding of stakeholder interests, patterns, and behaviors; specifically, we hope to learn more about how different stakeholders act to advance their own goals, how policymakers react to stakeholder pressure, and how they determine which interests to prioritize when making decisions. Stakeholders' involvement in the development of child and maternal nutrition policies was analyzed using the stakeholder salience model. This framework provides three stakeholder salience analysis variables, including urgency, legitimacy, and power, to determine which stakeholders play the most significant role in shaping policies pertaining to maternal and infant nutrition.

METHODS

Study Context

Pakistan was a signatory to the MDGs and showed its commitment to promptly address malnutrition

as one of the important agenda items of the MDGs program. The MDGs activities came to an end in 2015 with numerous nutrition-related targets that were left unfinished. An analysis of those unfinished MDGs targets was considered warrant by the research team and, therefore, in 2021, a research study was planned to retrospectively analyze the nutrition-related MDGs targets. Pakistan has immense commitment for a successful conclusion of the SDG as witnessed by a great number of initiatives launched to boost up the efforts for uplifting child and maternal nutrition [8].

Study Design

This research used a cross-sectional observational study design.

Study Settings and population

The research study was conducted in the Khyber Pakhtunkhwa (KPK) province of Pakistan. Previous published literature describes the organization of the Pakistani healthcare system, as well as the healthcare priority procedures and issues [9]. Findings of the present work are based on a survey conducted for the purposes of the first author's PhD dissertation.

Samplings

Respondents for the present study were experts (ex-service men, government officials, workers from various NGOs and academicians and researchers in the fields of health and nutrition, preferably in the field of child and maternal health/nutrition). Experts were selected using a hybrid of stratified random sampling and snowball techniques. After extensive discussion, our research team was of the view to select two cities – Islamabad (the country capital city) and Peshawar (the provincial capital city) as the two sample strata. This selection was made based on the assumption that great majority of the potential experts might had their work and/or residence address of these two cities. In addition to this stratified sampling, snowball sampling was done in order to include experts deemed important by the respondents of these two main cities. The experts were asked to mention all other experts they knew, who had filed and/or research experience in child and maternal nutrition and health. in addition, experts were considered relevant if they had sufficient theoretical and applied understanding of the MDGs in general, and the MDGs pertaining to maternal and child nutrition in particular. Participants were selected because of their prominence in determining priorities at the national and global levels. Subject expertise constitutes an established knowledge base, where participants' professions or first-hand lived experiences represent the unique understanding of the subjects of interest [10]. The choice and range of the desired expertise depends on the objective, however including representatives of the target population is considered an important component, due to their familiarity with the construct through direct personal experience [10]. Hence, eligibility criteria for subject experts were that they had to be policymakers, academicians, and/or researchers with relevant knowledge and experience.

The particular profile of the panelists (e.g. years of experience, field of expertise, etc.) is guided by the aims of the study [11,12]. We prioritized the recruitment of experts with both field and research experience (a minimum of 5 year of field experience and at least two articles published in peer-reviewed journals). However, we also considered experts with experience in only one setting when they reported substantial field experience only (≥ 5 years) or high research achievement only (≥ 5 papers). For the current study, the aim of these criteria was threefold: (1) to include different kinds of expertise, (2) to include different opinions (as the criteria used retained experts independently of their adhesion or reluctance in including child and maternal nutrition in nomenclature systems) and (3) to ensure geographic representativeness.

In terms of sample size, we planned to recruit between 30 and 45 experts (which was judged by the research team as an ideal balance between efforts needed for panel management and stability of results). A list of national experts on child and maternal nutrition was generated. These potential experts were then categorized and ranked according to their residence, research impact and clinical experience. Of the initial 85 initially identified invitations, 27 experts (31.8%) did not answer the e-

mail message, 7 (8.2%) declined to participate and the remaining 51 (61.4%) agreed to participate and completed the eligibility survey. After analyzing eligibility criteria, 2 (2.4%) experts were excluded because they did not match the requested criteria (they reported no clinical experience and published the required scientific papers). Of those who met inclusion criteria, all 49 met the criteria and were included in the expert panel.

Data Collection

Before actual data collection, a workshop ('Stakeholders and the MDGs Period') was held in March, 2022 with the collaboration of Nutrition International (NI), Pakistan. The main objective of the workshop was to elaborate on the nutrition policy status in Pakistan. The proceedings of the workshop have already been published [13]. The workshop was followed by Focus Group Discussion (FGD) sessions. We believed that the workshop followed by an elaborated FGD had significantly explained the objective of the study. Therefore, for formal data collection, a questionnaire was designed with both close-ended and open-ended questions. In general, the questionnaire contained three main parts. Part I asked the experts about the general demographic information (age, gender, marital status etc), field of study, area of practical experience etc.

Part II of the questionnaire had questions related to the effects of Covid-19 on the efforts of the MDGs leftover agenda that were continued in the SDGs in progress. The first question was: To what extent have the following issues become more challenging around the SDGs in the context of COVID-19? The second question was: Based on your experience, how could Covid-19 present challenges to programs initiated during the MDGs era and continued as an extension in the SDGs period? The third question was: what priority actions should be taken to mitigate impacts of Covid-19 on global child and mother nutrition?

Reflexivity

A multidisciplinary team consisting of a PhD student trained in conducting qualitative research (AJ); an associate professor in nutrition with ample experience in social network analysis and qualitative research (IA); a professor expert in data analysis (SSS), a professor and senior researcher in nutrition data quality management (AMA); a professor and researcher having special expertise in data analysis and report writing (PN). All questionnaires were administered by the PhD student and responses on the Likert scale were received by him. The PhD research student was also responsible for communication with the experts' panel and conducting the interviews, FGDs and a series of seminars and workshops.

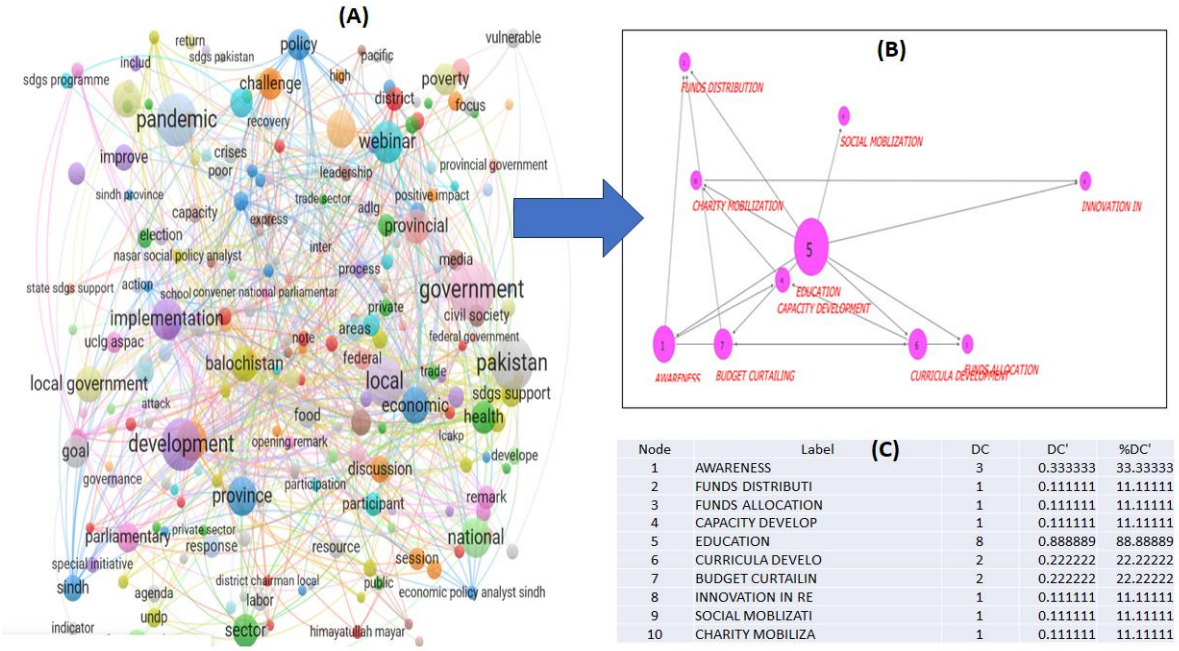
Statistical Analysis

The social network analysis was performed to derive key themes from the qualitative data we obtained from the respondents (Part II of the questionnaire). Gephi 0.10.1, an open-source software package, was used for social network data analysis and visualization. Thematic analysis was conducted on these data. There are numerous methods for thematic analysis. Among these, network analysis can be implemented as one of the strategies to generate themes from qualitative data. To do this, codes constructed from the data were depicted as nodes. The relationship between codes was denoted as their co-occurrence within a unit of analysis. Thus, if two codes overlapped on the same unit of analysis, then the nodes symbolizing the codes were connected with an edge. Two codes that co-occurred in multiple units of analysis are definitely more closely related than two codes that only cooccur in one unit of analysis, or none at all. Therefore, the edges were weighted, to denote the frequency of two codes co-occurring within different units of analysis. Till this point, the networks involved in theme-generating process used codes as nodes and the relationship between the codes (their co-occurrence within the unit analysis of data) as edges, as well as weighted. We then used modularity optimization algorithm to detect existing communities within the networks. These communities represent the themes of qualitative data. In brief, the thematic analysis consisted of six stages 14]; namely (1) getting familiar with the data; (2) formulating initial codes; (3) generating

(initial) themes; (4) reviewing the resulting themes; (5) defining and naming the themes; and (6) writing the report. In this study, network analysis was employed in stage 3 to construct themes.
This study was carried out in accordance with the established ethical norms and procedures after approval by the relevant bodies of the Bacha Khan University Charsadda. Under the direction of the Graduate Study Committee (GSC) and the Advanced Study and Research Board (ASRB), Bacha Khan University Charsadda, we have used a methodologically and ethically sound approach to collecting and processing data for this project. Bilateral agreements on data protection have contributed to this. By taking part in the survey, respondents acknowledged and agreed to our data protection rules.

RESULTS AND DISCUSSION

Respondents were questioned about the most difficult obstacles Covid-19 has presented to their SDG-related work. To what extent would Covid-19 provide difficulties for initiatives launched in the context of the MDGs and carried through into the SDGs? The question allowed for more in-depth responses from responders regarding other difficulties. This data is presented in Figure 2 below. Frequently seen words, such as 'lifestyle' and 'eating,' reinforce the range and diversity of challenges experienced in different contexts, however the centrality of 'nutrition-surveillance', ‘nutrition-governance’, and ‘multisectoral approach’ in the graphic reinforce the need for these challenge presented by Covid-19. The results show responded perceived ‘funds distribution’, ‘social mobilization’, ‘charity mobilization’, ‘innovation in research’, ‘education/awareness’, ‘capacity building’ and ‘budget curtailing’ as the main challenges posed by Covid-19 to child and maternal nutrition.



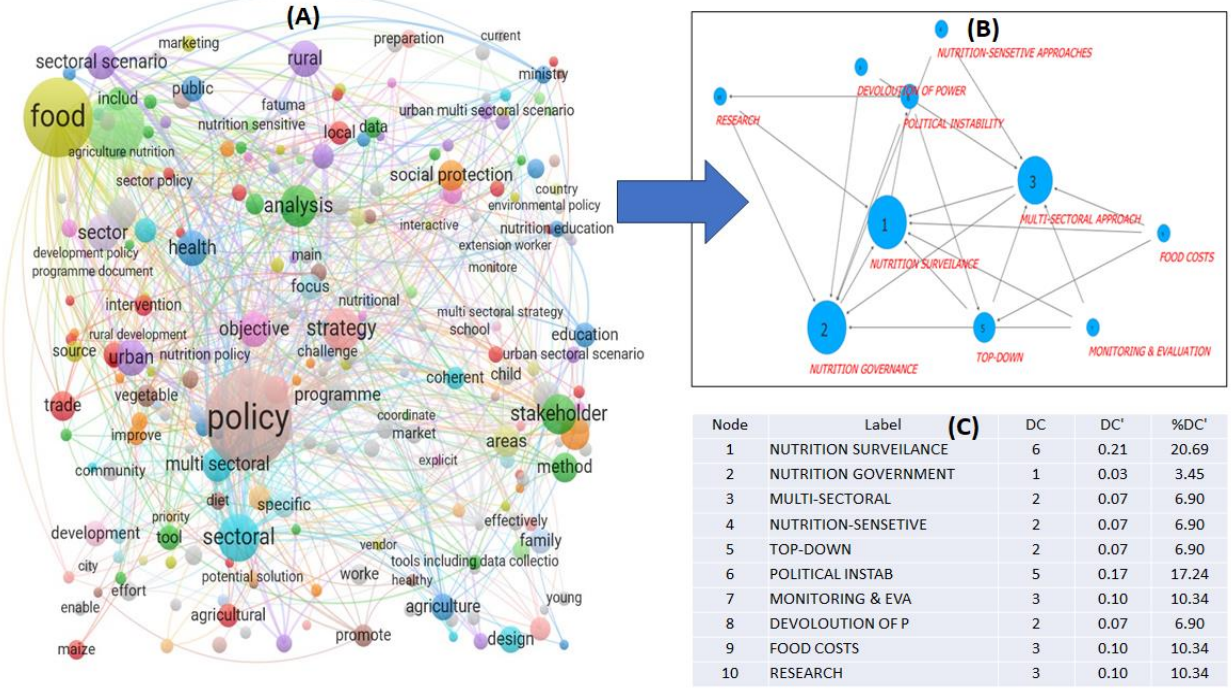
Node	Label	DC	DC'	%DC'
1	AWARENESS	3	0.333333	33.33333
2	FUNDS DISTRIBUTI	1	0.111111	11.11111
3	FUNDS ALLOCATION	1	0.111111	11.11111
4	CAPACITY DEVELOP	1	0.111111	11.11111
5	EDUCATION	8	0.888889	88.88889
6	CURRICULA DEVELO	2	0.222222	22.22222
7	BUDGET CURTAILIN	2	0.222222	22.22222
8	INNOVATION IN RE	1	0.111111	11.11111
9	SOCIAL MOBLIZATI	1	0.111111	11.11111
10	CHARITY MOBILIZA	1	0.111111	11.11111

Figure 1: The effects of Covid-19 on child and maternal nutrition for immediate attention.

Text network analysis was used to generate the figure. (A) shows text network analysis of the data (Questionnaire, the interviews and FGDs with respondents). (B) shows the most important themes derived from (A) based on the network centrality measures. Each pink ball (node) shows a theme derived. The lines connecting these balls are ‘edges’. This network was calculated on the experts scoring for each theme that has relation with another theme. (C) shows the network centrality measure ‘Degree Centrality’ (DC) for each of the ten parameters. In undirected networks, the DC index is the sum of edges attached to a node u. In directed networks, the index is the sum of outbound arcs from node u to all adjacent nodes (also called "outDegree Centrality"). If the network is weighted, the DC score is the sum of weights of outbound edges from node u to all adjacent

nodes. Derived from (C), DC Sum = 21.000000; Max. DC'=0.888889(node5);MinDC'=0.111111(node2); DC' classes= 4; DC' Sum = 2.333333; DC' Mean = 0.233333; DC' Variance = 0.052963. Analyses were performed using Gephi software.

Respondents were also given the option to submit suggestions for how to deal with the worldwide child and maternal nutrition crisis brought on by Covid-19 by asking what measures should be prioritized. Figure 3 shows text network analysis reflecting the responses to this topic. In response what can be done to address these challenges, responded suggested these: 'nutrition-sensitive strategies', devolution of power', 'political stability', strong nutrition surveillance system', 'multi-sectoral approach', 'controlling food costs', 'nutrition governance', 'stronger monitoring/evaluation strategies' etc.



(C)

Node	Label	DC	DC'	%DC'
1	NUTRITION SURVEILANCE	6	0.21	20.69
2	NUTRITION GOVERNMENT	1	0.03	3.45
3	MULTI-SECTORAL	2	0.07	6.90
4	NUTRITION-SENSETIVE	2	0.07	6.90
5	TOP-DOWN	2	0.07	6.90
6	POLITICAL INSTAB	5	0.17	17.24
7	MONITORING & EVA	3	0.10	10.34
8	DEVOLOUTION OF P	2	0.07	6.90
9	FOOD COSTS	3	0.10	10.34
10	RESEARCH	3	0.10	10.34

Figure 2: Actions of highest priority for reducing the effects of COVID-19 on child and mother nutrition and health.

Text network analysis was used to generate the figure. (A) shows text network analysis of data (Questionnaire, the interviews and FGDs with respondents). (B) shows the most important themes derived from (A) based on the network centrality measures. Each blue ball (node) shows a theme derived. The lines connecting these balls are 'edges'. This network was calculated on the experts scoring for each theme that has relation with another theme. (C) shows the network centrality measure 'Degree Centrality' (DC) for each of the ten parameters. In undirected networks, the DC index is the sum of edges attached to a node u. In directed networks, the index is the sum of outbound arcs from node u to all adjacent nodes (also called "outDegree Centrality"). If the network is weighted, the DC score is the sum of weights of outbound edges from node u to all adjacent nodes. Derived from (C), DC Sum = 29.000000; MaxDC'=0.206897(node1); MinDC'=0.034483(node2); DC 'classes=5; DC' Sum=1.000000; DC' Mean = 0.100000; DC' Variance = 0.002485. Analyses were performed using Gephi software.

DISCUSSION

To the best of our knowledge, this the first study retrospectively investigating the stakeholders' characteristics who were actors in child and maternal nutrition during the MDGs era. The responded of this study, who were experts from diverse fields of population health sectors, identified a wide range of challenges posed by the Covid-19 pandemic. The respondeds also suggested numerous

measures to cope successfully with these challenges and to help in successful conclusion of the SDGs, in general, and those related to the child and maternal nutrition, in particular.

In the present study, the perceived challenges posed by Covid-19 to child and maternal nutrition as identified by the experts included 'funds distribution', 'social mobilization', 'charity mobilization', 'innovation in research', 'education/awareness', 'capacity building' and 'budget curtailing' etc [15-17]. In response what can be done to address these challenges, responded suggested these: 'nutrition-sensitive strategies', devolution of power', 'political stability', strong nutrition surveillance system', 'multi-sectoral approach', 'controlling food costs', 'nutrition governance', 'stronger monitoring/evaluation strategies' etc. These findings are in line with other research studies [18-20]. Haji and Himpel proposed a holistic, systematic conceptualization for integrating sustainability and resilience principles within the food sector. This structure offers a roadmap for fortifying food security, ultimately advancing the cause of public health and well-being. It is poised to serve as a valuable resource for researchers, facilitating the exploration of sustainability and resilience in the context of food supply chains and providing policymakers with actionable insights for implementing these vital approaches [18].

In Pakistan, like the rest of the world, SDGs is an extension of the MDGs. The success of SDGs mainly rests on lesson we have learned from our experience with the MDGs. Therefore, the respondents were also asked some additional questions to address how the pandemics like Covid-19 could have an impact on the SDGs related to child and mother nutrition. More direct effects on poverty, food security, health and well-being, the economy and multilateralism, gender equality, and governance have been identified in studies of the Covid-19 pandemic [21,22].

This empirical research has several obvious caveats. To start, people who fill out surveys often lie about their accomplishments or other positive aspects of themselves. Because of the social sensitivity associated with the topic of nutrition, some respondents may have exaggerated the qualities of some stakeholders with regards to the nutritional status of children and mothers. The maternal and child nutrition MDGs have also been explored in a broad sense, without focusing on any specific issues. More in-depth and nuanced understanding of the nutrition for child and mother management process might be gained from studies on stakeholders to more particular to nutrition for child and mother situations. Archival materials and semi-structured interviews were the primary sources of data collection. Triangulation was achieved by the use of archival sources. The stakeholder connections of case study organizations were mapped using historical materials prior to conducting interviews. After conducting the interviews, we returned to the historical materials to locate and match the supporting evidence for the conclusions. More than 500 pages of archival information were compiled from various sources. All interviews followed the same pattern of questions. Each participant was given the option of having their interview done in either English or Urdu. A trained assistant recorded the interviews in the format preferred by each subject, whether its audio alone, video only, or both. Two of the interviews refused to be recorded on video or audio, therefore notes were taken instead.

Data from a single source may potentially introduce bias into the analysis. Surveys, interviews, and archive materials were the three most often employed data gathering techniques in empirical studies in the stakeholder salience paradigm. There are benefits and cons to all three data collecting strategies. For instance, surveys have been called into question due to the predetermined group of people they invite to respond [23]. This might lead to include or eliminating those that are ultimately unimportant. Data from a single source may potentially introduce bias into the analysis. The limited time span inherent in survey research is another drawback of the method. Also, structured interviews follow a predetermined path of questioning and provide what can be called "casual inferences" about stakeholder connections, but they might be tainted by bias from poorly formulated questions and erroneous data from poor memory. Evidence was gathered using i) archival documents and ii) semi-structured interviews, with the benefits and drawbacks of each approach taken into consideration. Multiple sources, such as evaluation reports and yearly performance

reports, were mined for archival data pertaining to the stakeholder connections of the case study organizations.

CONCLUSION

In conclusion, the emergence of Covid-19 has its implications that negatively affect the SDGs agenda and need appropriate measures to protect child and maternal nutrition.

DATA AVAILABILITY

Part of the data may be made available on reasonable request

CONFLICT OF INTEREST

All authors declare 'no conflict of interest'

ACKNOWLEDGEMENT

We are very much thankful to Nutrition International (NI), Pakistan for the technical support provided during the survey and the workshop.

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