

The Reality of Evidence-based Decision Making in Humanitarian Programming An Exploratory Study of WASH Programs in Uganda

Khanpour, Milan; Meesters, Kenny; Paulus, David

DOI

[10.1109/GHTC46280.2020.9342885](https://doi.org/10.1109/GHTC46280.2020.9342885)

Publication date

2020

Document Version

Accepted author manuscript

Published in

2020 IEEE Global Humanitarian Technology Conference, GHTC 2020

Citation (APA)

Khanpour, M., Meesters, K., & Paulus, D. (2020). The Reality of Evidence-based Decision Making in Humanitarian Programming: An Exploratory Study of WASH Programs in Uganda. In *2020 IEEE Global Humanitarian Technology Conference, GHTC 2020* Article 9342885 (2020 IEEE Global Humanitarian Technology Conference, GHTC 2020). Institute of Electrical and Electronics Engineers (IEEE). <https://doi.org/10.1109/GHTC46280.2020.9342885>

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

The Reality of Evidence-based Decision Making in Humanitarian Programming: An Exploratory Study of WASH Programs in Uganda

Milan Khanpour
Department of Environmental Science
Radboud University
Nijmegen, The Netherlands
milan_95@msn.com

Kenny Meesters
Department of Information Management
Tilburg University
Tilburg, The Netherlands
<https://orcid.org/0000-0002-8324-956>

David Paulus
Department of Multi-Actor Systems
Delft University of Technology
Delft, The Netherlands
<https://orcid.org/0000-0002-5719-3849>

Abstract— With ongoing research, increased information sharing and knowledge exchange, humanitarian organizations have an increasing amount of evidence at their disposal to support their decisions. Nevertheless, effectively building decisions on the increasing amount of insights and information remains challenging. At the individual, organizational, and environmental levels, various factors influence the use of evidence in the decision-making process. This research examined these factors and specifically their influence in a case-study on humanitarian organizations and their WASH interventions in Uganda. Interviewees reported several factors that impede the implementation of evidence-based decision making. Revealing that, despite advancements in the past years, evidence-based information itself is relatively small, contradictory, and non-repeatable. Moreover, the information is often not connected or in a format that can be acted upon. Most importantly, however, are the human aspects and organizational settings that limit access to and use of supporting data, information, and evidence. This research shows the importance of considering these factors, in addition to invest in creating knowledge and technologies to support evidence-based decision-making.

Keywords—*Evidence-based decision-making, humanitarian organizations, WASH, knowledge sharing, information management*

I. INTRODUCTION

Diarrhea has a significant impact in Uganda, as it is one of the major childhood killer diseases in the country. Every day, 33 children in Uganda die due to diarrhea associated with poor hygiene, inadequate sanitation, and lack of access to safe water [1]. In 2008, 16% of all under-five child mortality was caused by diarrhea [2]. Drinking unreliable water sources and the spread of pathogens due to contaminated hands are the main reasons for the spread of diarrheal diseases in Uganda. Despite improvements and ongoing developments, according to UNICEF, 33% of Ugandan children do not have access to safe water, and 60% of the children live at least 30 minutes walking distance from a water source [1]. It has been shown that 7% of the population practices open defecation because basic sanitation remains a huge challenge [3]. In 2018, there were 167 villages declared and certified open defecation free [3]. The overall access to basic sanitation services for households is 34% [4].

These statistics illustrate the importance of WASH-programs (Water, Sanitation, and Hygiene) to support public health. They also illustrate the increasing amount of scientific knowledge and insights through fieldwork, and information on various solutions that are available to humanitarian, development, civic, and government organizations. Organizations that are working to address these WASH-related issues and strengthen the public health system through policies and interventions. This broad body of knowledge plays an important role in designing, implementing, and evaluating WASH-programs because it provides decision-makers with key insights to design more efficient and effective interventions and also provides justification for the decisions made [5] [6].

A. Information & Decision making

Advances in information & communication technology enable decision-makers to access large quantities of information from a wide range of sources in a decreasing amount of time. For example, the above country-specific information can be found on public repositories such as Reliefweb.int (<https://reliefweb.int/country/uga>), scientific knowledge on WASH via the Delft University “Global”-program (<https://www.tudelft.nl/global/>), and many others. At the same time, the advancements in information and information technologies allow for more transparency and accountability. Specifically, in the process of management and decision making, these trends have spurred on evidence-based management [7]. With the underlying objective, that decisions and practices are motivated and supported by the best available evidence.

Similar advancements and trends can be identified throughout the entire humanitarian and development domain [8]. On the one hand, an increasing amount of evidence, information, and data are available to support decision and policymaking in the humanitarian domain. This information is also available and accessible via a myriad of platforms and systems. At the same time, there is an increasing, in- and extrinsic encouragement for organizations to use and share knowledge, best practices, and information throughout their decision-making processes [9].

However, various factors play into each decision and change if and to what extent decision-makers fully rely on the available information or evidence. These include human factors

II. RELATED WORK

such as bounded rationality [10] and relying on past experiences, traditions, or intuition [11]. There are also organizational factors that influence decision making when multiple decision makers and stakeholders are involved [12]. Furthermore, the context and operational circumstances in which the decisions are being made influence the use of information and evidence [13].

B. Research objective

To move towards more evidence-based decision making is a frequently repeated call by humanitarian organizations and practitioners, from the field to the global policy level. Nevertheless, evidence in humanitarian programs is challenging to establish. High uncertainties, in-access, political pressures, often hinder the collection and reporting of reliable evidence [14]. In addition, these circumstances leave room for biases. In the absence of reliable evidence, people tend to rely on personal experience or *gut feeling*. Furthermore, even when reliable, new information is available, people might disregard it in favor of previously formed assumptions [14].

Research findings from numerous studies in the past decades promote the use of evidence-based information, promising to result into the best possible practice [15, 16]. However, reviewing the literature clearly shows that the translation of evidence-based information into practice is not that easy [17, 18]. This gap between evidence-based decision-making and the implementation of interventions is well-recognized [19]. Therefore, there is more need for an in-depth understanding of which factors influence the difference between evidence-based decision-making and actual implementation [17, 20].

There is a multitude of reasons to explain the difference between the actual real-world outcomes and those that would result from an evidence-informed decision-making process [13]. In this paper, we aim to explore these reasons further. Using a case-study, we explore the various barriers decision-makers in the humanitarian field face to optimally use the information at their disposal as part of an evidence-based decision-making approach. Using a grounded approach, we specifically explore the various reasons and barriers that inhibit the use of this evidence. We aim to identify and classify these various barriers and, as such, provide a basis for the development of a more comprehensive understanding of factors that facilitate or impede the decision-making process.

C. Structure of the paper

The paper is structured as follows. We first explore the existing body of knowledge on decision making processes in humanitarian aid. Specifically, we focus on factors of influence on the utilization of evidence in the decision-making process. From this review, we distill a specific knowledge gap to be addressed in this research. Next, we develop the research approach to address this knowledge gap, following an exploratory case-study methodology. In the results section, we present the direct findings from this case-study and the interviews conducted. We conclude the paper by further examining the results and discuss academic and practical implications. Finally, we present several directions for future research based on the results of this study.

Decision making in humanitarian settings occurs in uncertain, risky, time- and resource-scarce environments [21]. These circumstances make gathering quality evidence and finding optimal decisions challenging [22]. Yet, humanitarian organizations strive to act evidence-based [23]. How successful are they in making evidence-based decisions? What factors support and hinder evidence-based decision making in humanitarian contexts?

Research shows that increased availability of information does not address all requirements for evidence-based decision making [24]. Although evidence-based decision-making is being advocated in the humanitarian sector to achieve the best possible results, decisions are not always rational [25]. Three key factors seem to influence evidence-based decision-making: individual, organizational, and environmental factors [26].

A. Individual factors

Aspects related to limited cognitive availability, or bounded rationality, limit the extent to which human decision-makers can take new information into account [27]. Bounded rationality leads decision-makers to make satisficing choices rather than optimal ones. Given the time-scarcity of humanitarian problems, basing decisions on good-enough evidence might be often favorable [28]. In addition, as more information becomes available, individuals might be facing information overload [29]. Especially humanitarian contexts with their risky, complex and uncertain problems leave room for heuristics and cognitive biases in decision making [30]. For example, people tend to rely on too small sample sizes, only search for information that proves preliminary assumptions right or anchor their judgment around arbitrary cues [31, 32].

In summary, individuals make decisions based on traditions, rules, cultural norms, advice or actions of others, personal wisdom that has been acquired in the past, and intrinsic preferences [33]. Cognitive abilities and personality traits define how we perceive judgmental tasks and make decisions. There is a real risk that certain factors lead to suboptimal decisions. These individualistic factors are accompanied by factors stemming from the context in which the decision is being made. Organizations, based on their culture and objectives, follow certain rules and procedures, which suggest certain courses of action and decisions [34].

B. Organizational factors

Often, decisions in a humanitarian context are not individual choices but are made in an organizational setting or team [35]. This may happen when problems are too complex to be solved individually, and more diverse insight and knowledge is needed to solve them [28]. Sometimes, this may lead to groupthink, whereby loss of individual creativity and independent thinking occurs [36]. Some decision-makers strive to maintain harmony and to avoid controversial issues in a group setting, which can also lead to irrational decision outcomes. On the other hand, experienced managers often rely on their intuition in risky, time-constrained situations, and their experience leads them to make favorable decisions for their team [37]. Additionally, previous studies on organizational performance in humanitarian contexts found conflicts between

organizations' headquarters and field offices. Where field offices perceived headquarters to be detached from reality, prolonging action, and overly complicated bureaucratic procedures [44].

C. Environmental factors

Humanitarian organizations also have to consider a set of environmental factors, such as the wishes and conditions of their national and international donors, their budget, human resources, expertise, and mandate [38]. Donors may provide funding to aid organizations in the areas or projects that they favor for political reasons. Politics and strategic actions may affect the decision-making process at every level [33]. This further confirms that a relationship exists between environmental characteristics and rationality which can lead to quick decision making within short time constraints but can also increase general environmental uncertainty [39]. These environmental variables, which are not under the control of the decision-maker, may have a significant impact on the rationality of decision-making.

D. Knowledge gap

Based on the review of previous studies, the following gap becomes evident in the literature. While we know that the characteristics of humanitarian settings likely influence decision making, the concrete factors decision-makers perceive as facilitating or impeding have been understudied. In the remainder of this paper, we aim to address this gap by understanding what factors influence humanitarian responders in basing their decision making on evidence. In the following section, we outline our research approach to address this gap.

III. RESEARCH METHOD

A. Case-study

Uganda lists within the top 15 countries with the highest child mortality caused by diarrheal diseases. As a low-income country, there are significant resource limitations to tackle WASH issues. In response, humanitarian organizations have been involved in WASH programs within Uganda for several decades. We therefore select Uganda as the case study area for our research. We are interested in the response of international humanitarian organizations, rather than national, local organizations, to increase the generalizability of our findings. We argue, as all organizations included in our interview sample are active in other countries in similar activities, our findings also partly apply in these contexts. We use semi-structured interviews because it allows interviewees to reflect on experienced challenges in WASH decision making and how those challenges were perceived. From these challenges, we can understand the potential influences of various factors, thus answering our research question.

B. Data collection

A total of 14 interviewees with representatives of humanitarian organizations and concerned with WASH programs in Uganda were interviewed. Interviewees included project managers, regional and country directors, portfolio managers, (global) WASH coordinators, and consultants. Interviewees were representing organizations from larger humanitarian organizations to smaller organizations based in

the Netherlands, Uganda, and the United Kingdom. All interviews were conducted between March and July 2019 and interviewees were recruited through snowball sampling. The interview protocol was centered around decision-making processes in the WASH sector and what humanitarian organizations were doing to combat diarrheal diseases in Uganda, thereby focusing on what factors influenced the use of evidence in practice. Examples of questions were as followed:

- On what information or evidence did you base the decisions you made during the design of the program?
- What kind of information would you have needed to make better decisions to combat diarrheal diseases?
- How do organizations/decision-makers catch up with the increasing amounts of evidence-based information?
- In which way do you use evidence-based information in your organization for the decision-making process?

The interviews followed a semi-structured approach. Interviewees were asked for permission to record the interview for transcription and analysis. Recorded interviews were transcribed via an online program and coded and analyzed in Atlas. An open coding approach was used to identify factors influencing evidence-based decision making. Table 1 provides several examples of these codes used in the analysis. The open coding approach resulted in two main categories.

First, a set of codes that described the decision-making approaches and the use of evidence in this process. This provided a descriptive narrative of the challenges encountered. This would for example highlight the challenges in finding or accessing the right evidence and the quality of the evidence. This first set of codes are more descriptive in nature and provide insights into the 'state of the art' of evidence usage. The second set of codes related more to the factors of influence described earlier. These codes provided insights into how individuals, organizations and the environment would encourage the development, identification and use of evidence in the decision-making process. This second set of codes provided more explorative insights and provided the main focus of the analysis.

Table 1 Example Codes

Concept	Element	Example codes
Evidence (descriptive)	Use in decision-making process	Not evidence based, Pre-existing knowledge or experience, Active evidence building
	Accessibility of evidence	Access to sources, usability of the evidence, costs of obtaining evidence
	Quality of evidence	Evidence / reality gap, conflicting evidence, absence of evidence
Factors of Influence (explorative)	Individual	Feeling, Experience, Habits, Information Overload, Bias
	Organizational	Dialogue, Procedures & Policies, Organizational / peer influence, Capacity
	Environmental	Cultural believes, Political context, Time-pressure, Networks

The full interview-protocol, codes, and analysis are available in the following repository:
<https://www.researchgate.net/publication/343281461>

IV. RESULTS

Interviewees reported on numerous factors that support and hamper the implementation of evidence-based decision making. We categorize these factors as individual, organizational, and environmental.

A. Individual factors of influence

To acquire more in-depth domain knowledge, e.g., in epistemology, was mentioned to understand the root factors and consequences of diarrheal diseases better and to roll out better public awareness campaigns.

“It would be valuable to have a great understanding of medical epidemiology to inform public health for WASH response.”

- Interview A (Code: Experience)

This is accompanied by the ambition to include more academic research into the design and implementation of WASH programming. However, information overload is a commonly reported issue.

“It is hard to find research because you have to look at a million sources.”

- Interview B (Code: Information overload)

To broker available knowledge, interviewees envisioned more investment in an information management capacity.

“[You] need knowledge managers who manage the knowledge for your staff members and how you can help to select the information that you need to read.”

- Interview B (Code: Information overload)

Not only in terms of staff positions but also in terms of information systems that support the addressing of information needs. However, interviewees were skeptical towards the objectivity of such systems, as they would come with their own biases, and people tend to use such systems in their own biased ways.

“It is more the algorithm behind the computer that helps you to select the knowledge that you want to read. But then who makes the decisions of that. It is always a little bit biased; I would say.”

- Interview B (Code: Bias)

Importantly, interviewees categorize some decisions as less evidence-needy, meaning they tend to make those decisions in the absence of evidence and rely on their professional experience and intuition.

“[For] some decisions that I have to make, I do not need any evidence.”

- Interview A (Code: Experience, Habits)

Finally, it was reported that even when evidence is available, it is not always acted upon. In some instances, evidence might be neglected in favor of already made assumptions, an indication for confirmation bias [40].

“The information is there, but I think that it depends more on the will to execute it. At the same time, you have a preference for information. Sometimes we are biased to deal with information because we get used to it.”

- Interview C (Code: Bias)

B. Organizational factors of influence

Factors influencing evidence-based decision-making on an organizational level include the network capacity of organizations that allow well-connected organizations to acquire evidence easier than less connected organizations.

“We have many information sources. If you want more information, it is just a phone call or an e-mail away”

- Interview D (Code: Dialogue)

Data was described as a sort of power tool when it comes to argumentation over what courses of action to take. Who holds the best data, can influence program implementation the most.

“We do use evidence-based decisions. It changes our policies and procedures. [...] No one is coming and tells us this is the way it should go. No one does this without data.”

- Interview E (Code: Procedures & policies)

More sophisticated ambitions towards knowledge acquisition within organizations were mentioned. However, these processes were reported as not being formally implemented organizational procedures and rather individualistic tasks and responsibilities.

“I think like everyone, try to read as much as possible as quickly as possible. We are not dealing with it very formally. It is every staff member that must handle itself. Thinking and trying to find the right sources of information and taking 10% of your working time to make sure that you also have read within your field. And try to keep up with all this information. We don't have a process for this.”

- Interview B (Code: Peer influence)

Information overload was also reported on an organizational level, with ubiquitous ICT access mentioned as a root cause. Organizations try to combat the information multitude through modeling approaches but lack capacities for their full utilization.

“Sometimes, there is too much information overload because of ICT access. The most important part is your intervention and your reasons if you have the evidence. We do have some models, but the WASH sector has a long way to go.”

- Interview C (Code: Capacity)

Learning from previous mistakes does not seem to be emphasized in organizations and mostly excluded in internal reflections and lessons learned processes.

“When we make a mistake, I am not sure if this is shared internally or with other organizations.”

- Interview B (Code: Dialogue)

Finally, organizations' data creating processes were sometimes described as donor-driven, meaning data was collected for the purpose of reporting rather than informing evidence-based decisions.

“I must be very honest; the information in the NGO sector is used for reports. For that report to influence the funding next year may not necessarily happen.”

- Interview D (Code: Procedures & policies)

C. Environmental factors of influence

Interviewees reported several factors influencing evidence-based decision making due to environmental settings around WASH programs. One concern was that WASH programs are always embedded in political contexts. If evidence about working solutions is available, it still needs political will and influence to implement them.

“[...] when you have your data and evidence about what is working and not working, [...] then you can push certain policy changes or not. That process requires more than evidence. It is a political process, and they need much more than evidence.”

- Interview F (Code: Political context)

This is particularly challenging as political processes take more time to materialize, but the time constraints that often accompany WASH decision making often require quick actions.

“A lot of decisions have to be made very quickly, so it is a balancing act between time and making the right decisions. There is no point in making an important decision and making it too late.”

- Interview A (Code: Time-pressure)

Another environmental factor reported was the interaction among organizations. Interviewees expressed the need for more intersectoral collaboration to avoid siloed approaches and to promote holistic programming.

“The challenge with the humanitarian response is a tendency to put people in circles with their own people, so the WASH people with the WASH people. The health people with the health people. We need

to work innovatively and intersectoral and more effectively to make the best decisions.”

- Interview A (Code: Networks)

V. DISCUSSION

Factors influencing evidence-based decision making in humanitarian settings can be categorized into individual, organizational, and environmental factors. While some factors act as facilitators for evidence-based decision making, others hinder it. Much information, especially about hygiene, the transmission of pathogens, and their role in diarrheal disease, is missing. Missing information is, however, just one of the many factors identified. These identified factors build a strong case for the challenges to act evidence-based in humanitarian decision making.

Based on our interview results, we can summarize the found influential factors for evidence-based decision making in the model illustrated in Figure 1 below.

A. Individual

Issues reported on the individual level include the need for more domain knowledge and stronger inclusion of scientific knowledge as well as the presence of cognitive biases. It is important to mention that these factors are context dependent. ICT access, on the one hand, can ease information access, but it can also overburden the decision-maker and lead to information overload. Another example is experience and the reliance on heuristics and biases. For experienced decision-makers, trust in individual intuition can lead to favorable decisions, while reliance on intuition in inexperienced decision-makers can lead to malpractice.

In summary, individual decision-makers choose and implement WASH interventions based on their background, expertise, network, resources, intuition, and decision-making is, therefore, not always based on evidence-based information.

B. Organizational

On the organizational level, challenges arise because organizations have competing agendas, objectives, understandings, and they have their own way and culture regarding how to create change and make decisions. Sharing information is happening in established organizational networks, and some organizations, often local ones, are sidelined. Donor pressure hinders organizations from implementing WASH programs as envisioned or dictate a particular way of response entirely. Organizations lack funding to make programs sustainable and to leave ownership of interventions to local communities.

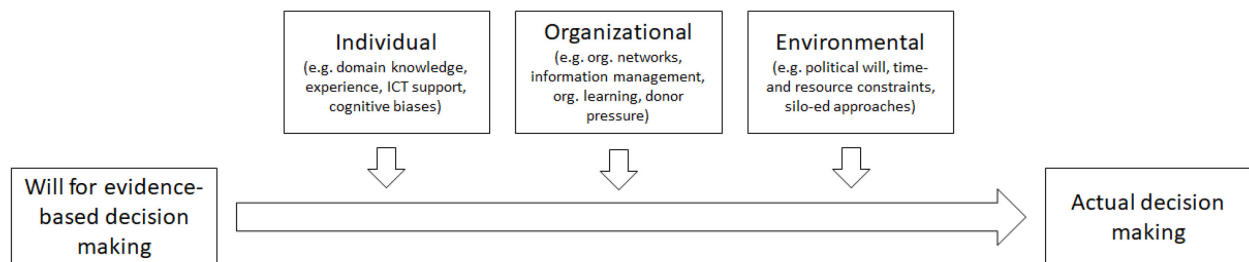


Figure 1 Influential factors on the decision-making process

C. Environmental

On the broader environmental level, the use of evidence needs to be accompanied by the political will to push for certain courses of action. Time- and resource-constraints often impede project implementation strongly. The overall humanitarian response is made up of various, homogenous, siloed clusters with little inter-sectoral collaboration and communication.

The majority of the actors indicated that evidence-based information was getting more and more important in the WASH sector due to the high failure of WASH interventions in the past. However, evidence-based information was not always connected, and often the research was superficial, not replicable in other settings, and anecdotal to some extent.

D. Improving the use of information and evidence

The results above show that decision makers are well aware of the increased information availability relevant to the decisions they are faced with in the design, implementation, and evaluation of WASH programs. Many indicate that the use of the information as evidence in their decision-making processes indeed help them not only make more informed choices, but also supports the accountability for their decisions to donors as well as communities and other stakeholders.

Nevertheless, reflecting on the actual decision-making process, the interviewees have identified barriers that prevent them from fully utilizing this potential. Furthermore, from the above results, as well as the interviews themselves, there are several aspects that can be identified to improve the use of evidence in the decision-making process.

Resources & training: The use of evidence and the increased access to information in the decision-making process require additional capacities of decisions makers. Retrieving, processing, and adopting various sources puts an additional strain on already scarce resources in the humanitarian context. Increasing capacity to be able to make use of the available evidence is therefore a key aspect to lower the barriers. This relates to both the available resources to process information in a timely manner, but also to specific capabilities [41]. The increased capacity and capability allow decision-makers to make sense of the available information as well as the complex humanitarian environment [42].

Actionable information: In addition to increasing the capacities to work with information, the delivery of information can also contribute to the reduction of barriers. Rather than making all information available for decision makers to search through all information, the offered information should be tailored and fitted with the information needs [43]. Specifically, the delivery of information needs to happen in the right form, at the right time, in the right ‘frame.’ Reducing the barrier for decision-makers to actually use already available evidence-based information. Development and trends in information and communication technology can enable this tailored information delivery [22].

Lean information management: Finally, the generation of more information and evidence, respectively spurred on by technical developments as well as increased knowledge generation and research, leads to an abundance of information. Decision makers are increasingly facing challenges in dealing

with an ‘information overload’, rather than a shortage of information [44]. A paradigm shift is needed to move from ‘push-driven’ information generation to needs-driven information gathering [30]. Based on a better understanding of the decisions and the related information needs.

While each decision and situation will have specific requirements for using information, the recommendations provide several key aspects that could be considered when designing for example an information system to deliver information. The capacities to process information, the delivery of information and the overload of available information all contribute to the increase of barriers for decision makers to rely on information and the evidence extracted from it. While these aspects apply specifically for the individual and organizational factors of influence, they rather address cross-cutting issues related to the accessibility, usability and delivery of information to the decision maker and the specific decision-making process.

VI. CONCLUSION

In recent years, two main factors have contributed to the increased availability of knowledge to support the development, implementation, and evaluation of humanitarian and development programs. First, developments such as increased access to mobile technology and improved connectivity have enabled individuals, organizations, and government agencies to not only collect more information but also process and disseminate this information. Secondly, a policy shift requires organizations to provide more accountability, transparency, and support for their decisions and decision-making process. These two factors continuously reinforce each other; as technology enables the availability and use of information, policies are developed to build on these options. In turn, these policies encourage organizations in using and generating more evidence.

Decision-makers, in our research, highlighted that they recognize the importance and potential of scientific, validated, and evidenced-based information in their decision-making process. However, we found that the use of this information in the decision making in the Ugandan WASH sector is impeded due to three categories of factors: individual, organizational, environmental. The level to which each of these factors play a role in the decision-making process varies according to the decision type and circumstances in which these decisions are made. For example, our findings illustrate a difference between reported challenges by decision-makers in the field compared to decision-makers in headquarters.

A. Limitations & Future research

The research presented in this paper is a preliminary step towards a more integrated perspective on decision making in humanitarian and development contexts. Despite its explorative nature, the research shows that decision makers in general recognize the need for information in their decision-making process, while also recognizing the potential and risk of increased information availability. However, a disconnect remains due to accessibility, delivery, and usability of the information.

In the short term, the results of this research can be used to examine various options to address these barriers. One, for

example, maybe the further development of information sharing tools, training, or decision-making policies to support organizations in addressing these barriers. Secondly, the results in this paper support the development of improvements in the information delivery architecture. Several recommendations have already been identified to provide decision makers with a more tailored information offer, and a better fit within the decision-making process. It is expected that -as information and communication technology further develops and gets adopted- tools and technologies will be able to streamline these processes and deliver more relevant information, at the right moment, to the right person. The results from this research can be used to keep in mind what individual, organizational and environmental factors need to be considered to make this happen.

This research, therefore, provides a starting point for a more complete model of decision-making processes in humanitarian and development contexts. Further steps could include a more detailed examination of the relationships and influences that exist between the various barriers uncovered by this research and the specific elements in the individual and group decision making processes—further unifying the rational approaches to decision making with the cognitive, social, and organizational realities in the humanitarian and development context.

REFERENCES

- [1] UNICEF, "Uganda. Water, Sanitation and Hygiene (WASH). Increasing access to safe drinking water, improved sanitation and hygiene practices.," 2015.
- [2] A. N. Muli, "Variables That Impact Incidence of Diarrhea Amongst Under-Five in Uganda," 2018.
- [3] UNICEF, "Uganda. Annual Report " 2018.
- [4] JMP, "Joint Monitoring Programme for Water Supply, Sanitation and Hygiene Uganda " 2019.
- [5] K. Takemura, "The effect of decision frame and decision justification on risky choice," *Japanese Psychological Research*, vol. 35, no. 1, pp. 36-40, 1993.
- [6] C. W. Choo, "The knowing organization: How organizations use information to construct meaning, create knowledge and make decisions," *International journal of information management*, vol. 16, no. 5, pp. 329-340, 1996.
- [7] J. Pfeffer and R. I. Sutton, "Hard facts, dangerous half-truths, and total nonsense: Profiting from evidence-based management: Harvard Business School Press," 2006.
- [8] J. Western, "Sources of humanitarian intervention: Beliefs, information, and advocacy in the US decisions on Somalia and Bosnia," *International Security*, vol. 26, no. 4, pp. 112-142, 2002.
- [9] D. Zhang, L. Zhou, and J. F. Nunamaker Jr, "A knowledge management framework for the support of decision making in humanitarian assistance/disaster relief," *Knowledge Information Systems*, vol. 4, no. 3, pp. 370-385, 2002.
- [10] H. A. J. D. Simon and organization, "Theories of bounded rationality," vol. 1, no. 1, pp. 161-176, 1972.
- [11] M. Leach, "Evidence - based practice: A framework for clinical practice and research design," *International Journal of Nursing Practice* vol. 12, no. 5, pp. 248-251, 2006.
- [12] D. J. J. o. p. e. Black, "On the rationale of group decision-making," vol. 56, no. 1, pp. 23-34, 1948.
- [13] J. Rycroft - Malone, G. Harvey, K. Seers, A. Kitson, B. McCormack, and A. Titchen, "An exploration of the factors that influence the implementation of evidence into practice," *Journal of clinical nursing*, vol. 13, no. 8, pp. 913-924, 2004.
- [14] F. Bourguignon and J.-P. Platteau, "The hard challenge of aid coordination," *Journal World Development* vol. 69, pp. 86-97, 2015.
- [15] H. D. Dickinson, "Evidence-based decision-making: an argumentative approach," *International Journal of Medical Informatics*, vol. 51, no. 2-3, pp. 71-81, 1998.
- [16] R. C. Brownson, J. G. Gurney, and G. H. Land, "Evidence-based decision making in public health," *Journal of Public Health Management Practice*, vol. 5, pp. 86-97, 1999.
- [17] A. Kitson, G. Harvey, and B. McCormack, "Enabling the implementation of evidence based practice: a conceptual framework," vol. 7, no. 3, pp. 149-158, 1998.
- [18] L. Orton, F. Lloyd-Williams, D. Taylor-Robinson, M. O'Flaherty, and S. Capewell, "The use of research evidence in public health decision making processes: systematic review," *PloS one*, vol. 6, no. 7, 2011.
- [19] C. M. Clancy and K. Cronin, "Evidence-based decision making: global evidence, local decisions," *Health affairs*, vol. 24, no. 1, pp. 151-162, 2005.
- [20] C. Dietrich, "Decision making: Factors that influence decision making, heuristics used, and decision outcomes," *Inquiries Journal*, vol. 2, no. 02, 2010.
- [21] E. Gralla, J. Goentzel, C. J. P. Fine, and O. Management, "Assessing trade - offs among multiple objectives for humanitarian aid delivery using expert preferences," vol. 23, no. 6, pp. 978-989, 2014.
- [22] D. Paulus, K. Meesters, and B. Van de Walle, "Turning data into action: supporting humanitarian field workers with open data," in *ISCRAM*, 2018.
- [23] V. De Geoffroy, Léon, V. and Beuret, A. , "Evidence-based decision making for funding allocations," *Inspire consortium. Humanitarian policy for action.* , 2015.
- [24] C. M. Clancy and K. Cronin, "Evidence-based decision making: global evidence, local decisions," *Journal Health affairs*, vol. 24, no. 1, pp. 151-162, 2005.
- [25] M. Pappaioanou *et al.*, "Strengthening capacity in developing countries for evidence-based public health: the data for decision-making project," *Social science medicine*, vol. 57, no. 10, pp. 1925-1937, 2003.
- [26] K. M. Sutcliffe and G. McNamara, "Controlling decision-making practice in organizations," *Organization science*, vol. 12, no. 4, pp. 484-501, 2001.
- [27] H. A. Simon, "A behavioral model of rational choice," *The quarterly journal of economics*, vol. 69, no. 1, pp. 99-118, 1955.
- [28] P. Knox Clarke and L. Campbell, "Decision-making at the sharp end: a survey of literature related to decision-making in humanitarian contexts," *Journal of International Humanitarian Action*, vol. 5, pp. 1-14, 2020.
- [29] B. Van de Walle and J. Dugdale, "Information management and humanitarian relief coordination: findings from the Haiti earthquake response," *International Journal of Business Continuity Risk Management*, vol. 3, no. 4, pp. 278-305, 2012.
- [30] T. Comes, "Cognitive biases in humanitarian sensemaking and decision-making lessons from field research," in *2016 IEEE International Multi-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support (CogSIMA)*, 2016, pp. 56-62: IEEE.
- [31] A. Tversky and D. Kahneman, "Belief in the law of small numbers," *Psychological bulletin*, vol. 76, no. 2, p. 105, 1971.
- [32] A. Tversky and D. Kahneman, "Judgment under uncertainty: Heuristics and biases," *Science*, vol. 185, no. 4157, pp. 1124-1131, 1974.
- [33] J. G. March, "How decisions happen in organizations," *Human-computer interaction*, vol. 6, no. 2, pp. 95-117, 1991.
- [34] A. Obrecht, "Using Evidence to Allocate Humanitarian Resources: Challenges and Opportunities," 2017.
- [35] M. Cruz and A. Schmitt, "Strategy and knowledge management in humanitarian organizations," in *Decision-making in Humanitarian Operations*: Springer, 2019, pp. 55-75.
- [36] I. Janis, "Groupthink," *IEEE Engineering Management Review*, vol. 36, no. 1, p. 36, 2008.
- [37] G. Klein, R. Calderwood, and A. Clinton-Cirocco, "Rapid decision making on the fire ground: The original study plus a postscript," *Journal of Cognitive Engineering and Decision Making*, vol. 4, no. 3, pp. 186-209, 2010.

- [38] L. Heyse, *Choosing the lesser evil: understanding decision making in humanitarian aid NGOs*. Routledge, 2016.
- [39] S. Elbanna and J. Child, "The influence of decision, environmental and firm characteristics on the rationality of strategic decision - making," *Journal of Management Studies*, vol. 44, no. 4, pp. 561-591, 2007.
- [40] R. S. J. R. o. g. p. Nickerson, "Confirmation bias: A ubiquitous phenomenon in many guises," vol. 2, no. 2, pp. 175-220, 1998.
- [41] R. J. E. s. w. A. Bose, "Knowledge management-enabled health care management systems: capabilities, infrastructure, and decision-support," vol. 24, no. 1, pp. 59-71, 2003.
- [42] M. J. C. p. a. Howlett, "Policy analytical capacity and evidence - based policy - making: Lessons from Canada," vol. 52, no. 2, pp. 153-175, 2009.
- [43] L. Derczynski, K. Meesters, K. Bontcheva, and D. J. a. p. a. Maynard, "Helping crisis responders find the informative needle in the tweet haystack," 2018.
- [44] M. van den Homberg, K. Meesters, and B. J. P. E. Van de Walle, "Coordination and Information Management in the Haiyan Response: observations from the field," vol. 78, pp. 49-51, 2014.