

Knowledge Management Support to Public Health in Humanitarian Emergency

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Research

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Abstract

Background: In public health, decisions are mainly taken based on data and a move is needed towards evidence-based decision. Healthcare can profit from the several benefits that Knowledge management (KM) can provide. Several challenges still need to be overcome, some of which concern KM and others of which are specific to healthcare. Knowledge management is a discipline that has become an established part of many applications and techniques, but its adoption in healthcare has been challenging. This is because the healthcare sector tends to rely on knowledge and evidence-based medicine in the performance of its daily healthcare activities.

Methods: Bottom-up KM strategy is used for the study as the research is conducted into the activities of staff involved in key business processes. Interviews are conducted with participants selected by mixed purposeful sampling consisting of expert sampling (experience of health emergencies and indicators) and convenience sampling (ease of accessibility). Direct workplace observation is also used to obtain findings. A qualitative methodology is used in order to understand the findings.

Results: The study investigated the importance of KM support to public health and to the work performance during health emergencies. The research framework explores various aspects of KM to provide a clear understanding of KM and how it may affect the work performance during health emergencies in Sudan.

Conclusions: The key outcomes of the research findings associated to Knowledge management support to public health in humanitarian emergency are offered such as improve disaster risk management knowledge base system, strengthen central emergency expert team and KM support to the application of health indicators of emergency.

Background

During health emergencies, regular health information system interruption is common, so knowledge gap expected, which affects the accurate measures of health and the health factors (UNISDR, 2013). Bilukha (2008) states that during health emergencies there is a lack of agreement on which indicators should be used and to document what, at the same time many health indicators are difficult to measure well in emergency settings. Health professionals require accurate information and they need to be able access data rapidly from different sources and transform that data into information and knowledge to do their jobs (Liebowitz, Schieber, & Andreadis, 2010). They also have to cooperate with other organizations in order to be able to respond effectively to public health threats (Liebowitz, Schieber, & Andreadis, 2010). Many research studies have been investigated on the relationship between KM and health (Bordoloi & Islam, 2012; Chen, 2013; Hassan, Hayiyusuh, & Nouri, 2011; Liebowitz et al., 2010; Mohanty et al., 2005). Their work provides an excellent foundation for this study. Despite the growing literature in the area of KM, the adoption of KM by health partners still very low. This could indicate that health partners do not have a clear understanding of KM or it could be due to health partners not being ready to share their

knowledge with others. Therefore, this study tries to fill the knowledge gap by focusing on understanding the importance of KM support in the application of health indicators in non-normal situations (emergencies).

Public Health Importance of the Paper

Emergency management is often misunderstood as being only those activities related to an emergency response situation. However, it is associated with emergency planning in its largest context and covers a range of business continuity management and preparation, training and preparedness programs, as well as disaster response and recovery. Moreover, while an integrated response is desired, in reality the various organizations involved usually work independently. Civil society organisations are often ignored as well. Health organisations tended to be slow and resistant to change. In addition, they were less familiar with dealing with emergency situations and were more focused on their routine workload.

Despite the growing literature in the area of KM, the adoption of KM by health partners still very low. This could indicate that health partners do not have a clear understanding of KM or it could be due to health partners not being ready to share their knowledge with others. Therefore, this study tries to fill the knowledge gap by focusing on understanding the importance of KM support to public health in humanitarian emergency.

The study is expected to lie in its potential to find a way to monitor and to improve the performance of health partners during emergencies and disasters. To the best of the researcher's knowledge, this study is the foremost to study the application of KM in relation to health indicators. The study intends to provide a clear comprehension of KM and how it may affect the application of health indicators during emergencies, to identify the current range of health indicators, and to explore to what extent appropriate health indicators are used in emergencies.

Disaster Risk Management

Disaster Risk Management refers to the systematic analysis and management of health risks, posed by emergencies and disasters.

Knowledge Management System

Knowledge Management System (KM System) refers to a system for [managing knowledge](#) in organizations for supporting creation, capture, storage and dissemination of information, generally a KM system is computer based. KM Systems deal with information so they are a class of information systems and may build on or utilize other information sources. A computer-based KM System includes a database that contains knowledge items and an activity record that is associated with the knowledge items (Murphy M.E, 2006), stated that KM Systems are vital for disaster detection, response planning, and management. These systems aid in early warning and provide decision support for disaster response and recovery management.

Health Information System

A health information system or HIS is a set of modules and procedures prepared with the objective of producing information to improve healthcare management decisions at all levels of the health system (Lippeveld, Sauerborn, & Bodart, 2000).

Knowledge Management and Health

As per the Association of State and Territorial Health in the USA, KM can be important tool for the public health (ASTHO-USA, 2005). Public health is a multidisciplinary arena that reports a broad collection of topics affecting to the health of human populations (ASTHO-USA, 2005). Furthermore, public health specialists place trust in research approaches to determine causal and contributing health factors, and use a public health approach to monitor, avoid and solve health problems.

Knowledge in healthcare is depend on high-value of information that is essential for healthcare experts to act effectively. In this regard, due to the emergence of KM, the raw empirical data can be changed into experiential knowledge and provide experts with a decision-support system (Abidi, 2001).

Knowledge management in healthcare would be of attention to all those who are elaborate in health services delivery (Abidi, 2001) as KM provides easy and fast access to a treasury of knowledge. The KM model goes beyond the need to manage information burden (Davenport & Marchand, 1999). It satisfies the needs for applying best practice and providing high quality health services, which gains patient satisfaction. The model goals at better efficiency, harmonisation, and cost reduction. It is a collection of knowledge that increases healthcare experts' effectiveness and productivity. A KM system offers them the chance to learn how other contemporaries positively solve similar problems (Lusignan, 2002)

The above views are echoed to an extent in a report the Institute of Medicine in Washington (2002), whose recommendations covered multiple aspects of public health and summarized that public health must have the freshest information in order to conduct analyses and to report and disseminate appropriate information.

Furthermore, Abidi (2001) states that KM in healthcare can be seen as the combination of methodologies and techniques to enable the creation, identification, gaining, development, protection, distribution and then utilization of the several facets of a healthcare enterprise's knowledge assets.

Importance of KM for the Health System

In the context of health, KM is a systematic approach that can be applied to guarantee that health experts approach the most recent knowledge, and to guarantee that they can apply that knowledge to their work at all levels inside the health system, i.e. at the international, regional, and national levels (Bocock, Campbell, McLean, Sullivan, & Wilhelmsen, 2012).

Health workers are using a common language to describe health systems that refers to six building blocks that are based on a framework developed by the WHO (WHO, 2007). The blocks are: (1) health service delivery, (2) health workforce, (3) HIS, (4) vaccines, medical products and technologies, (5) health systems financing (6) leadership and governance.

Health practitioners who are unclear about KM might assume that KM methods, practices, and tools work only within the health information system block, which focuses on sources of data, health indicators, data use, management and dissemination. However, regardless of which building block professionals are working in, despite everything they need explicit information, data, and knowledge to inform the decision-making process, and along these lines, KM can play a significant role in each of the six building blocks (Bocock, Campbell, McLean, Sullivan, & Wilhelmsen, 2012).

A study in 2013 notes that in spite of the availability of framework, strategies, and tools inside a HIS, what is regularly undeveloped is the limit with regards to information clients outside of the HIS to access and share information effectively (Nutley & Reynolds, 2013). This is one topic in which KM can add value. Furthermore, by enabling knowledge exchange, access, and use, KM goes beyond the HIS and cuts over each of the six building blocks (Bocock et al., 2012).

Methods

A knowledge management strategy is a plan that describes how an organization will manage its knowledge for the benefit of that organization and its stakeholders (Zack, 1999).

KM strategy can help to:

- Increase understanding and awareness of KM;
- Improvement of senior staff commitment;
- Transfer good KM practice;
- Provide a plan about where the organization is now, future requirements, and the strategy to reach goals;

The bottom-up KM strategy:

According to Robertson (2004), many KM strategies have focused solely on the top-down approach, identifying high-level objectives such as: 'Become a knowledge-enabled organization'. However, when there is limited understanding of the key issues and needs of staff throughout the organization, these initiatives find it difficult to engage staff in the required cultural and process changes (Jha, 2011). As a result, many of these initiatives have little long-term impact on the organization, despite initial efforts (Jha, 2011). Therefore, recognizing these issues, the current study adopts an approach that focuses much more strongly on the initial need analysis of organizational activities. According to Hansen, Nohria, and Tierney (1999), the major benefits of the bottom-up strategy are that it is holistic, solution-independent, straightforward and effective, and targets resources.

Processes for developing a KM strategy

Figure 1 below illustrates the steps channeled into developing a KM strategy.

The first step in the process is to find the key staff in the organization. The key staff are commonly those engaged with the most significant business activities. In general, the key staff are more likely to be those on the front line, rather than managers or administrative staff. However, this will rely upon the nature and structure of the organization.

The next step is the needs analysis. There is a wide range of needs analysis tools such as surveys, staff interviews, discussions and focus groups, as well as workplace observation, ask analysis and contextual inquiry. In practice, more than one tool may be used with a carefully chosen group of staff in order to ensure that a complete picture is obtained.

The third step is strategic input in which the whole strategic focus is recognized. This strategic focus then directs the KM strategy, providing a framework for the prioritization and selection of individual projects and activities. There are a number of input sources that can be drawn upon when defining the strategic focus (Robertson, 2004), including:

- Senior management contribution via facilitated discussions, interviews, or other interactions;
- Organizational strategy documents, such as the business plan or annual report; and
- Results of other strategic researches, such as staff satisfaction surveys.

These inputs can then be combined into a strategic focus for the KM activities.

Finally, the needs analysis and strategic input steps will bring to light a wide-ranging of issues and needs throughout the organization. Prepared with an in-depth understanding of the difficulties, issues and needs within the organization, then it is possible to determine appropriate strategies to address them. This will without a doubt incorporate a scope of long-term strategic and short-term tactical initiatives. In practice, each organization will apply an exceptional blend of short-term and longer-term projects to meet its KM needs.

Practising of KM Strategy in Research

The KM strategy literature discussed above shows that there are benefits to using the bottom-up strategy approach for KM research. Therefore, this approach was adopted by the current study to answer to the research questions.

In the first step, the key staff were identified based on their experience of health emergencies and were mainly employed by the FMOH and other partners. In the second step a needs analysis was conducted by using an interview technique. The interview questions were developed specifically to answer the research questions by drawing on the related theories in the research area, as shown in table 1 below.

Table 1 Basis of the interview questions

Research question	Related theory
How is a disaster information system used in your organization and what types of health indicators can be produced from it?	Each disaster and its context is different, so countries are being advised to improve their own disaster preparedness and develop health indicators for the most affected areas (Bayntun, Rockenschaub, & Murray, 2012).
To what extent can health indicators cover the systematic analysis and management of health risks?	To improve disaster risk understanding and disaster risk management performance, a clear, representative and strong system of indicators that can be easily understood by policy makers is required (Cardona & Carreño, 2011).
Do you think that the routine national health indicators are relevant to disaster risk management?	To accurately monitor impacts and trends, data on disaster impacts needs to be gathered by using more robust systematic procedures (WHO & UNISDR, 2012).
Do you think it is useful to allocate a set of health indicators for use during emergencies?	There is high variation between the indicators that agencies propose gathering (Roberts & Helderma, 2008).
To what extent are appropriate health indicators used for mitigation preparedness, response and recovery of risks in Sudan.	The emergency response includes a range of events aimed at protecting life and assets and deal with with the social disruption that disasters produce (Council National Research, 2006).
What are the common problems with the current health indicators for health risks?	Many health indicators are not easy to calculate well in emergency settings (Bilukha, 2008).
What are the current issues related to disaster information systems and knowledge management in regard to your organization's performance?	The concept of using an information system in disaster-affected areas became of great importance after Japan's Great Hanshin-Awaji Earthquake in 1995 (Badpa, Yavar, Shakiba, & Singh, 2013). Several researchers emphasize the importance of KM in disaster management as it can have a significant impact on managing the disasters and save many lives (Mohanty at al, 2005).

Briefly explain how existing knowledge and performance are affected by the use of knowledge management.

Do you think the existing disaster risk knowledge-based systems are flexible enough to accept new knowledge as well as validation processes?

A significant key to the success of information technology applications is the capacity to give clients the correct data at the right time (Turban, Aronson, & Liang, 2007). The analyses that a knowledge base can provide becomes a significant factor in making valuable decisions. It will assist the emergency response management (ERM) team to plan well before starting to build a project, for example, look at the professional's knowledge base that has been established based on past similar projects. (Arain, 2015).

Finally, based on the findings from the interviews, the needs were identified, and some recommendations were formulated regarding how KM can support the presence of appropriate health indicators. These steps can be also used for long-term planning as they can be used to highlight a range of general issues and needs that can arise during emergencies.

Research Framework

A review of the related literature suggests that the Global Knowledge Management Framework (GKMF) is a suitable framework to adopt for the purposes of the current study. The framework is supporting the fact of KM is highly dependent on the context and cannot be validated separately from practical implementations. The framework provides a reference for structuring research and practice projects as well as guiding adopters through implementation and deployment processes (Pawlowski & Bick, 2012).

The following describes the three main steps derived from the model that are used for the current study: (1) identify the context and barriers of stakeholders before designing related business and knowledge processes; (2) define the planned tools and supporting interventions based on the barriers; and (3) assess and evaluate the findings based on the suggestions obtained in the first step.

A detailed description of the conceptual framework in Figure 2 starts on the left-hand side of the diagram with the health partners, which in our study are the FMOH and other health partners. This is because the FMOH creates the emergency strategies to be used during emergency situations with the cooperation of other health partners.

Then, the knowledge component is enabled by the emergency strategies and it describes and characterizes the knowledge aspects and elements that are shared or required. In this step, the problems as well as resources representing existing knowledge are identified.

Thirdly, the knowledge component uses knowledge and business processes to improve performance and existing knowledge through validation, feedback and recommendation. These processes are

accompanied by interventions and supporting processes, which are accompanying processes to improve KM, as well as validation processes that measure the success of the interventions (R. Maier & Remus, 2003).

According to Bos (2004), results describe the key outcomes of knowledge processes by using assessments and metrics. Therefore, the results will be defined and measured based on validation and feedback. Results such as the measurement of knowledge (acceptance of existing health indicators and KMS) as well as the usability and usefulness of health indicators of emergencies will be addressed.

Analysis And Results

The study used qualitative methods in order to explore KM and understand KM use for emergencies. Ministry of Health of Sudan, UN agencies and NGOs are the study components, mixed method used to collect needed data to conduct the research, primary data obtained from the in-depth interviews and observations and secondary data covered library research for relevant literature obtained from all possible sources. Interviews conducted on the basis of saturation theory which is the stage in data collection when new data no longer bring additional insights to the research questions (Mack et al., 2005). Purposeful sample used to select participants. This involved expert sampling based on experience (health emergencies and indicators). 10 expert emergency officers were interviewed. A semi-structure depth interview technique was adopted. The analysis for the study is based on thematic analysis, the qualitative data analysis converted the transcribed interviews into thematic classification.

Research questions

Q1. What health indicators are normally used in emergencies in Sudan?

Q2. To what extent are appropriate health indicators used for emergencies in Sudan

Q3. How can knowledge management be used to improve the application of health indicators in emergencies in Sudan?

Qualitative Analysis Steps:

Manual qualitative analysis using Word documents was used to analyse the data and generate themes. The steps used to conduct this manual coding are described below (Adu, 2013).

Step 1: Assigning Labels to the Research Questions

Step 2: Code Relevant Statements and Put Them Under Research Question Labels

Step 3: Compile a List of Initial Codes

Step 4: Order Codes Alphabetically and Group them Under their Respective Labels

Step 5: Group Codes and Tally Frequency

Step 6: Generate Themes to Address the Research Questions

Step 7: Findings

Research Q1: What health indicators are normally used in emergencies in Sudan?

Theme 1: Set of emergency indicators

Theme 2: Relevancy of the used indicators

Research Q2: To what extent are appropriate health indicators used for emergencies in Sudan?

Theme 3: Emergency setting appropriate indicators

Theme 4: Leadership, partners commitment

Theme 5: No consistent indicators

Theme 6: DMIS indicators limitation

Research Q3: How can Knowledge Management be used to improve application of health indicators in emergencies?

Theme 7: Improve current disaster risk knowledge-based system and use of relevant knowledge sources

Theme 8: Strengthen the central emergency expert team

Theme 9: KM can Support use of appropriate indicators

Theme 10: Reprocess of archived knowledge

Theme 11: KM can improve performance through knowledge sharing, knowledge exchange among staff and decision-makers

Discussion

Research Implications:

The findings of this study have several implications for theory development, policy and practice. A description of these implications follows. In relation to theory development in regard to the role and use of KM and health indicators in emergencies, the findings of this study provide a comprehensive description of the Sudan context and the implications of using KM in disaster management are supported by recommendations to improve disaster management through KM practices. The effective use of health indicators is controlled by the limitations of the current DMIS. Therefore, the research offers

suggestive evidence to improve the comprehensiveness of the disaster knowledge-based system to cover all the disaster management phases based on the current one. This can be achieved by identifying the knowledge sources for each disaster phase, engaging partners to accept knowledge learning, knowledge sharing and knowledge acquisition, and enabling diverse groups to share and use disaster knowledge, as well as by looking at other sources for emergency indicators, such as the early warning disease surveillance system. The characteristics of the appropriate health indicators for emergency situations that were highlighted by this study are common and can therefore be generalized to other countries (WHO, 2010). These characteristics can be optimized by developing a standard operating procedures manual. Last but not least, the study findings appear to support the argument in favour of having core benchmarks and standard indicators for emergency preparedness and response (Schull et al., 2011). The study therefore suggests that, as part of the country's emergency strategy, a unified set of indicators be developed under the supervision of the FMOH, mainly by the central emergency expert team and in consultation with health partners. The indicators should have clear definitions and benchmarks to monitor emergency situations and stimulate actions and these indicators should be known and used by all health partners. Reaching this point is key for successful governance and coordination.

Limitations of the Research Study:

The first limitation of this study is that its findings are limited to the use of KM and health indicators during emergencies in Sudan. However, some of the findings can be generalized to other countries, as mentioned in the previous section. The second limitation is related to the accessibility of the participants and finding enough free time for the in-depth interviews with expert staff and top managers. However, the workplace of the researcher facilitated the arrangement of the interview time.

Recommendations for Future Research:

Based on the results of this study, there are a number of possible areas for future research. One would be the assessment of the quality of health services provided during emergencies, which could involve trying to define the minimum health services that should be provided in a quality manner, because the standards for quality are expected to change in emergencies. Another area of research work that could be would be an in-depth assessment of the characteristics of the appropriate indicators for emergencies, where the expected output would be a global guidance document that could include list of indicators to be use, how each indicator are calculated, the data source of each indicators, benchmarks for the indicators, time intervals for collection the indicators, the relevancy of the indicators according to type of disaster, and the relative importance of the indicators.

Conclusion

The key outcomes of the research findings associated to Knowledge management support to Public Health in Humanitarian Emergency are presented in the below diagram.

Abbreviations

FMOH

Federal ministry of health, KM:knowledge management, DMIS:disaster management information system.

Declarations

Ethics approval and consent to participate

Not applicable

Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

the study with input from Prof. Dr. Woods , All authors read and approved the final manuscript.

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Figures



Figure 1

Methodology to develop a knowledge management strategy adapted from Robertson (2004).

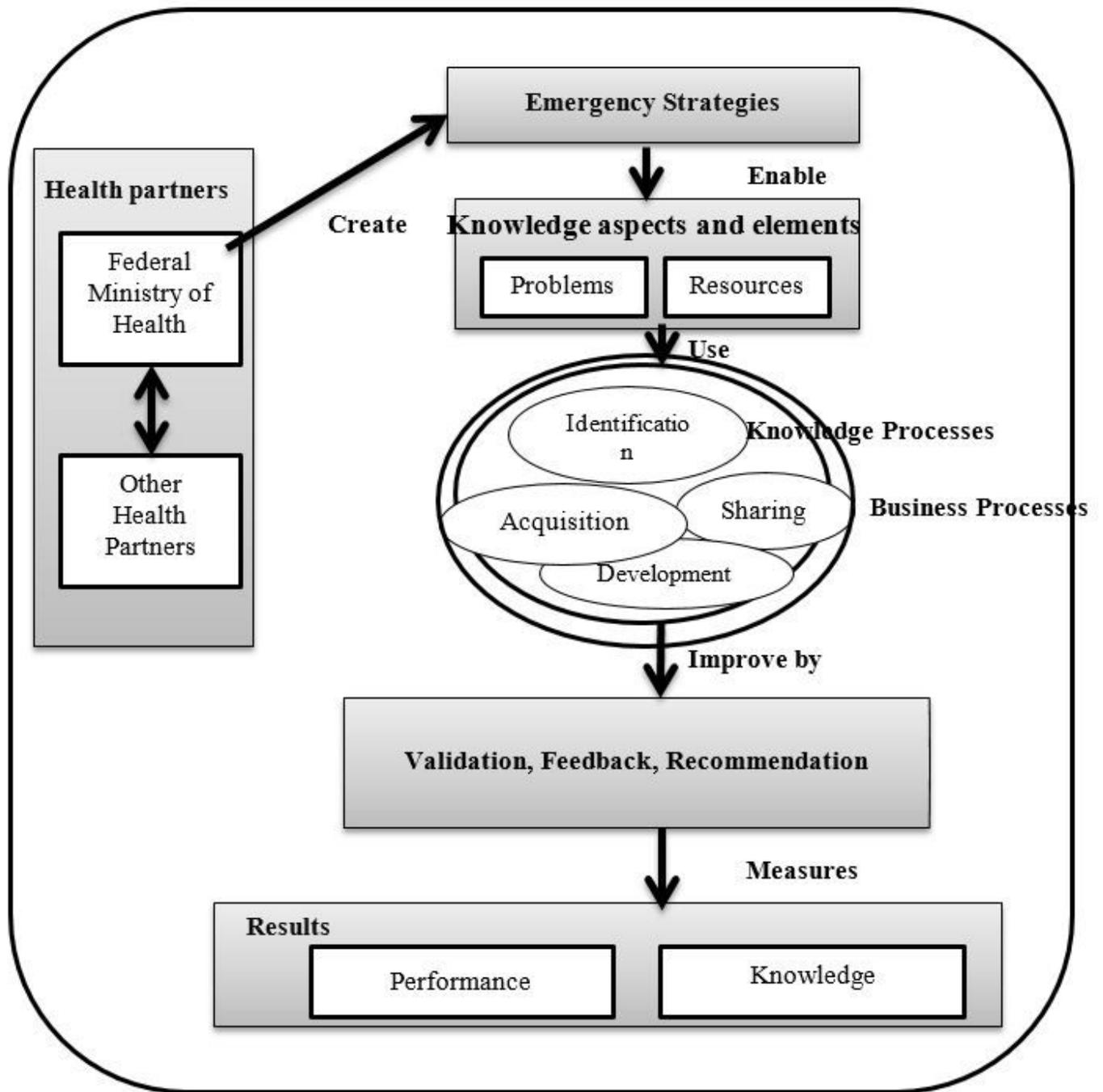


Figure 2

Conceptual framework from the GKMF (Pawlowski & Bick, 2012).

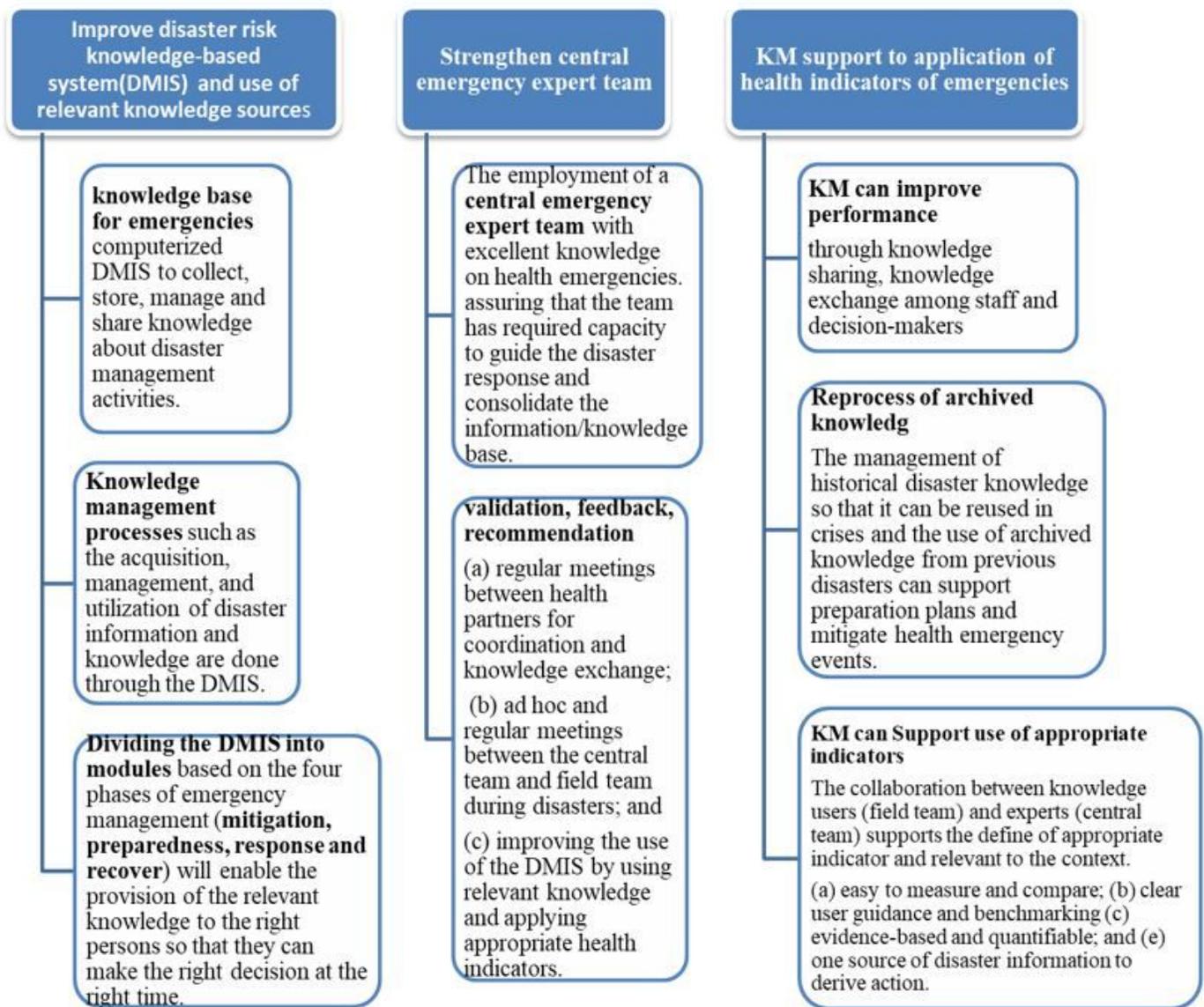


Figure 3

Research Findings Model.