

From Assessment to Action: Exploring the Dynamics Between Maturity Assessments and Strategy Implementation in Digital Health

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Abstract. A country's digital health maturity is a key factor in the digital transformation of a national health system. Although many maturity assessment models exist in the literature, they perform as stand-alone tools without a clear indication to inform a country's strategy implementation in digital health. This study explores the dynamics between maturity assessments and strategy implementation in digital health. First, it analyses the word token distribution of key concepts in indicators from five pre-existing digital health maturity assessment models and those originated from the WHO's Global Strategy on Digital Health. Second, it compares type and token distributions in the selected topics mapped against the policy actions under the GSDH. The findings reveal existing maturity models with a significantly heavier focus on health information systems and highlight gaps in measuring and contextualising topics e.g., equity, inclusion, and digital frontiers.

Keywords. maturity model, digital health, health system, strategy implementation

1. Introduction

The digital health maturity level of a country is a key factor contributing to the digital transformation of its national health system. Several technical support tools have been generated to keep up with the rapid evolution of digital health ^[1]. Maturity models or maturity assessment tools are common examples that have been widely used by governments, policymakers, and other stakeholders in the digital health ecosystem. Maturity models are defined as *means to describe a status of development* across multiple domains, including healthcare ^[2] or *vehicles to achieve operational excellence* ^[1] by offering orientation for systematic development or improvement ^[2]. Although many maturity assessment models exist in the literature, they perform as stand-alone tools

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defining static states of maturity with no clear potential to inform the implementation of a country’s digital health strategy or to cope with the pace of the digital transformation of health ^[3].

This study explores the dynamics between digital maturity assessments and the implementation of countries’ digital health strategies, and it is structured as follows: Section 2 introduces the resources sourced and methodology implemented to conduct the study, Section 3 describes the findings, and finally Section 4 concludes with a brief discussion highlighting potential future research.

2. Methods

To conduct this study, the authors followed a two-step process. Step one consisted of examining the word token distribution of key concepts and terms among maturity indicators. Step two compared the type and token distribution in the selected topics retrieved from the analysis of the GSDH’s strategic objectives (SOs) and mapped against the policy actions endorsed under the strategy document.

2.1 Resources

Among the digital health maturity assessment models identified in the literature review, only those adopted or relevant in one or more of WHO’s six Regional Offices were considered for this study. As a result, the following five models were retrieved:

Table 1. Brief description of pre-existing digital health maturity assessment models identified.

The Global Digital Health Index: private partnership initiative to track progress, monitor, and evaluate the use of digital technology for health across countries.	18 indicators distributed among 7 categories
The Information Systems for Health Maturity Assessment Tool: launched by the Pan American Health Organization to assess governance, data management, digital transformation, innovation and knowledge management organisational capacity.	115 indicators
The Maturity Model for Integrated Care: key achievement of the European Innovation Partnership on Active and Healthy Ageing to assess integrated care readiness.	Key activities grouped into 12 dimensions
The Digital Health Profile & Maturity Assessment Toolkit: introduced by WHO Regional Office of the Western Pacific to assists Pacific Island Countries to assess their digital health <i>capability maturity</i> to implement and evaluate national digital health programs.	119 indicators
The Global Survey on eHealth: launched by WHO to guide and provide Member States with data on effective practices and standards in eHealth to be used as benchmarks for development and monitoring progress.	84 indicators excluding those resulting from open questions

Besides these identified pre-existing maturity assessment models, aiming to prioritise countries’ interests and needs, the referred list of 68 policy actions for implementation mapped against the GSDH’s four SOs was also considered a relevant source from where to retrieve digital health indicators. As a result, 417 indicators were collected from the above resources.

2.2 Evaluation of word distribution of key concepts and terms in indicators

To conduct this study, the authors followed a two-step process. The authors first analysed the distribution status of key concepts and terms among the 417 indicators to understand

the commonalities and differences between the selected models. An open-source tool “KWIC”² was used to conduct the exercise. The top 200 highest distribution of word tokens from the texts were then selected and tracked back to all the indicators in which the tokens are present. Noise e.g., functional words were factored out. The tokens with plural or different tenses, e.g., system/systems were treated separately as they often represent different concepts in the context of health.

The authors then evaluated how relevant the indicators are to the current scope of the GSDH by applying a similar method as that described in Samo G *et al.*, 2022^[4]. A distribution comparison was conducted between types (number of different key concepts) and tokens (frequency of key concepts) in the selected topics identified from the list of policy actions mapped against the GSDH’s four SOs³. Many topics identified correlate to the seven building blocks endorsed under the WHO-ITU National eHealth Strategy Toolkit⁴. The indicators considered in this exercise contain at least one of the top 200 highest token distribution identified in the first step. The distribution rate is calculated by dividing the observed counts of each value with their totals.

3. Results

The exercise reveals two notable points. First, a heavy focus has been put on topics related to health information systems in the existing maturity assessment practice. For example, topics such as “infrastructure”, “governance”, and “capacity building” on the left side of the graph represent a much higher distribution of both type and token in the indicators, while the topics “health equity”, “inclusion” “emerging technology” take up much lower distribution, revealing gaps in the identified pre-existing models.

Moreover, it is worth noticing the distribution difference between type and token in the same topic. For example, “infrastructure”, “governance”, “capacity building”, “community engagement”, “communication” and “financing” all demonstrate a significantly higher distribution in types than in tokens. The higher distribution of types a topic possesses than that of tokens, the more diverse the set of descriptions can be labelled as the target topic (that do not necessarily appear literally as the meaning of the word token), thus indicating a higher level of maturity under certain topics. Following this analysis, one can assume that the topics “leadership”, “health equity”, and “inclusion” deserve further development to include more descriptions defining the concept.

² Tsukamoto S. KWIC Concordance for Windows. Version 5.4 [software]. Nihon University. 2023 Feb 24 [cited 2023 Apr 21]. Available from: <http://nuchs-corpus.japanwest.cloudapp.azure.com/kwic/>

³ SO1 Global collaboration and knowledge transfer, SO2 National digital health strategy implementation, SO3 Digital health governance, SO4 Human centred digital health system. World Health Organization. Global Strategy on Digital Health 2020-2025. Geneva: World Health Organization; 2021.

⁴ World Health Organization; International Telecommunication Union. National eHealth strategy toolkit. Geneva: International Telecommunication Union; 2012.

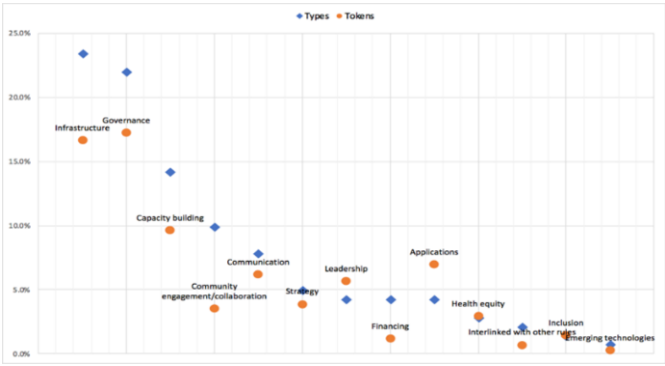


Figure 1. Comparison of type and token distributions in the selected topics identified in GSDH. *Topics in correlation to WHO-ITU National eHealth Strategy Toolkit seven building blocks.

4. Discussion

The above findings offer points of consideration for future improvement in assessing digital maturity. First, they show it is possible to have a reduced set of core indicators that represent the highest word distribution of key concepts; second, they call for action to develop new indicators that address emerging topics that are key to enabling digital health implementation at the national level. Furthermore, the resulting set of relevant indicators could be consequently mapped against the GSDH’s four SOs and list of 68 policy actions for implementation, identifying and assigning a relevant SO to each indicator and a set of relevant actions across all four SOs to track progress and inform policy options for digital health strategy implementation.

5. Conclusion

The likelihood of country digital health maturity assessments to inform strategy implementation counts upon demand-driven models, relevant lexical variations, and comprehensive concept descriptions.

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