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Digital Transformation and COVID-19 Crisis Management: A Case Study of a University Hospital Centre in Batna

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***Abstract*—**This study examines the relationship between digital transformation and COVID-19 crisis management at Benflis Touhami University Hospital Centre in Batna. It uses a case study design and a questionnaire completed by 101 healthcare and administrative staff. The data were analysed using descriptive statistics and simple linear regression. Digital transformation was assessed through five dimensions: digital strategic orientation, the digital environment, digital human resources, digital culture and awareness, and digital governance. The findings show a positive correlation between digital transformation and crisis management (R = 0.733). The model explains 53.7% of the variance in crisis management scores. Digital human resources recorded the lowest mean, whereas learning from the crisis ranked highest among the crisis management dimensions. The findings point to the importance of digital skills, proactive planning, and institutional coordination. Generalisation is limited, and the observed association does not establish causation.

***Keywords*—**digital transformation; health crisis management; COVID-19; university hospital centre; Batna.

Introduction

Managing a health crisis requires institutions to connect information, decisions, and coordination. Digital transformation has a role in how healthcare organisations organise this work. During the COVID-19 pandemic, a key question was whether digital capabilities were linked to an institution's ability to prepare for a crisis, respond to it, coordinate its activities, and learn from the experience.

This article examines the relationship between digital transformation and health crisis management in Algeria. It focuses on Benflis Touhami University Hospital Centre in Batna. Five dimensions of digital transformation are considered: strategic orientation, the digital environment, digital human resources, digital culture and awareness, and digital governance. Their relationship with crisis management is examined across preparedness and proactive planning, rapid response and intervention, communication, institutional cooperation, and evaluation and learning.

The central research question is: What is the nature of the relationship between digital transformation and COVID-19 crisis management at the university hospital centre under study? The study assumes a positive and statistically significant relationship between the two variables. It aims to assess their levels and examine the relationship between them. A case study design was adopted, with questionnaire data from 101 healthcare and administrative employees. Descriptive statistics and simple linear regression were used. The study provides field evidence to inform priorities for digital development in healthcare. It also recognises the limits of generalisation and distinguishes statistical association from causal inference.

Section One. Digital Transformation and Health Crisis Management: Foundations of Organisational Integration

Digital transformation in healthcare rests on strategic, technical, and human foundations. Their value becomes clear when an institution must prepare for a crisis, respond to it, and learn from it. The study therefore views health crisis management through the combined roles of information, skills, and institutional coordination.

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1. Digital Transformation in Healthcare Institutions and Its Organisational Dimensions

Digital transformation changes how an organisation operates and delivers its services. It brings technologies and data into work processes, decisions, and organisational relationships. Ismail, Khater, and Zaki describe this transformation as a broad process. Their definition covers changes to the business model, user experience, and operations, as well as skills, culture, and networks. This perspective is relevant to healthcare, where digital tools are embedded in both professional and administrative practices. Digital transformation must therefore be examined in terms of its integration into work and its use in delivering tasks and coordinating services[1]

In healthcare, this transformation is closely tied to the patient care pathway. Several actors generate, share, and use information at different stages. Electronic records and health information systems help organise patient data, examinations, treatment, and follow-up. Telemedicine and mobile health applications offer additional channels for communication and service delivery. These tools also create demands for interoperability, reliable access to information, and alignment with staff needs. Developing the digital environment is thus part of organising healthcare services. Its value lies partly in connecting stages and units of care[2]

Introducing such applications also requires a strategic direction. The institution must define priorities, objectives, resources, and monitoring arrangements. Clear priorities link digital projects to institutional needs. They also help sequence implementation and assess its requirements. An adequate digital environment includes equipment, software, and communication networks. Staff must also be prepared to use them. Digital competencies are important here. They include the knowledge and skills needed to understand systems, use them, and adapt professional practice to change[3] Together, strategy, technical capacity, and human competencies help explain why access to digital tools may differ from their actual use.

The use of these competencies also depends on organisational culture. Adoption is shaped by employees' willingness to learn, their confidence in change, and their opportunities to improve work procedures. Digital culture and awareness can therefore help explain whether use becomes stable and routine. Wokurka and colleagues link digital strategy with digital culture. Their work highlights the need to align institutional priorities with the values and behaviour that shape implementation[4] This gives the human dimension a wider meaning. It includes working conditions, communication, and the exchange of experience.

These dimensions also depend on governance arrangements. Such arrangements define responsibilities, coordination rules, and the use and protection of information. They matter because healthcare institutions involve many actors and systems. They help direct digital initiatives towards shared goals and monitor their implementation. This study therefore adopts five dimensions of digital transformation: digital strategic orientation, the digital environment, digital human resources, digital culture and awareness, and digital governance[5] Together, they frame digital transformation as an institutional process shaped by planning, implementation, use, and oversight. This framework supports the analysis of its relationship with health crisis management.

2. Health Crisis Management and Its Links to Digital Transformation

A health crisis places hospitals under pressure. It strains their ability to organise resources and services and meet rising needs. The response depends on the nature and severity of the threat, as well as available preparedness and intervention arrangements. Marre's study of crisis preparedness in healthcare facilities highlights the need for institutions to adapt their operations to exceptional conditions[6] The present study therefore treats crisis management as a process of risk assessment, resource mobilisation, coordination, and review.

Health crisis management links risk assessment with preparedness, intervention, and recovery. This sequence helps distribute responsibilities and skills across the crisis. Responses should build on earlier preparedness, while recovery measures should reflect needs identified during intervention. Burkle argues that complex public health emergencies require cooperation across disciplines. They also require effective use of expertise in prevention, preparedness, response, recovery, and rehabilitation[7] Sustained coordination among actors is therefore part of an institution's capacity to manage crises.

Such continuity also depends on how information is used and experience is reviewed. Monitoring and risk assessment guide preparedness. Updated information supports situational assessment during a response. Reviewing experience, in turn, allows procedures and plans to be revised. Aligne and Mattioli describe an overlapping crisis management cycle. Feedback begins during the crisis itself. Risk assessment and damage review continue during prolonged events, including epidemics[8] This approach directs attention to the links between preparedness, response, and learning. These links provide a basis for examining

digital transformation and health crisis management.

The study uses five dimensions to measure crisis management. Preparedness and proactive planning cover the assessment of needs, assignment of responsibilities, and emergency arrangements. Rapid response and intervention concern the mobilisation of resources and the implementation of measures as conditions change. Crisis communication involves sharing information and clarifying instructions. Institutional cooperation covers the coordination of roles and efforts. Institutional evaluation and learning address the review of decisions and outcomes and the lessons drawn for better practice[9] These dimensions reflect both stages of a crisis and functions that continue across stages. They are consistent with the importance of planning, communication, implementation, and evaluation in healthcare.

The link with digital transformation lies partly in the role of information in assessing a situation and coordinating decisions and interventions. Al-Najjar and colleagues describe the potential of electronic administration through databases, records archiving, incident documentation, and information exchange between leadership and field teams. These tools can be examined across crisis stages. Data may support preparedness, be updated and shared during the response, and be retrieved for evaluation[10] In this article, these are possible pathways that require field examination. Their value depends on the integration of digital systems into procedures and on staff members' ability to use them.

Crisis management also requires work procedures to be reviewed and weaknesses to be addressed. Luburić proposes a model of crisis prevention that combines change management, quality management, and risk management. Senior managers and employees share responsibility for improving processes and addressing the causes of problems. The model also stresses professional competence, trust, and teamwork. Successful changes must then be embedded in the institutional system[11] Under this approach, crisis preparedness is the result of continuous organisational work, the accumulation of experience, and regular review of practice.

The present study thus treats digital transformation as an organisational process. It combines strategic priorities, technical resources, human competencies, digital culture, and governance mechanisms. This perspective guides the examination of digital transformation and COVID-19 crisis management at Benflis Touhami University Hospital Centre in Batna. Staff assessments are used to measure both sets of dimensions. The analysis focuses on preparedness, response speed, communication, institutional cooperation, and the ability to evaluate and learn from the crisis. Its conclusions remain within the scope of the case and the available data.

Section Two. Digital Health in Algeria: The COVID-19 Response and Challenges of Institutional Integration

Algeria's experience of digital health raises a key question: How well can healthcare institutions absorb new technical capabilities into their work and decision-making? COVID-19 made this question more urgent. The pandemic required faster information exchange, better resource coordination, and continuity of care. The institutional dimension of digital transformation therefore concerns the fit between technical infrastructure, organisational rules, and professional practice. It is important to distinguish access to digital tools from their regular use and their actual capacity to support health crisis management.

1. Managing the Health Crisis in Algeria: Centralised Response and Information Coordination

Algeria's healthcare response to COVID-19 relied on central direction while mobilising hospitals to meet rising demand. At the start of the outbreak, laboratory testing was concentrated at the Pasteur Institute. The diagnostic network later expanded to regional and private laboratories. This experience shows the link between crisis response and the distribution of functions within the health system. Diagnosis connects case identification, referral to care, and epidemiological monitoring. Rising testing demand therefore required organisational change. Resources had to be distributed, and results had to move between the relevant institutions[12]

The implications of centralisation cannot be understood simply by noting the existence of national leadership. Standardised national guidance is different from the concentration of operational tasks. Shared guidance can make interventions more consistent. Centralised operations, however, depend on how well implementing bodies can handle growing and rapidly changing demand[13] National coordination must therefore be linked to local capacity for action, reporting, and adaptation. This link has a clear information dimension. Distributing tests across institutions can only achieve its full purpose when data are transferred, updated, and made available to the appropriate decision-makers.

These demands coincided with pressure on hospital capacity, equipment, supplies, and personnel. The response was also hampered by manual data management in some areas, inadequate equipment and connectivity in certain healthcare institutions, and overlapping administrative and medical responsibilities. Effective resource mobilisation requires accurate knowledge of what is available and where shortages exist. It also requires clear responsibilities and decision-making powers. Weak information coordination therefore affects the link between identifying needs and responding to them. The issue is not merely the speed of document exchange[14]

This distinction can be clarified by separating information that describes the crisis overall from information needed to organise the response inside a hospital. The number of reported cases reflects part of the epidemic's development. On its own, however, it does not show whether a ward can admit more patients or what resources it needs. Information is organisationally useful when it suits the decision being made. National planning requires different data from task allocation and patient monitoring within a hospital.

This raises a related question about the distribution of resources and decision-making authority. Expanding testing sites is not enough. Test results must reach laboratories, healthcare providers, and surveillance bodies. Similarly, hospital mobilisation requires a distinction between resources that exist on paper and those that can be deployed when needed. The role of digitalisation in Algeria's response should therefore be assessed by how well it connects information with action. Did it help identify needs, allocate resources, and monitor interventions? Or was its use limited to recording and exchanging data? Field evidence is needed to answer these questions. The presence of digital systems alone does not prove that integration has occurred.

The value of experience gained during a crisis extends beyond the immediate response. It also depends on whether lessons remain part of institutional practice after the crisis has subsided. Institutional learning means turning experience into stable procedures for information exchange and task coordination. These procedures should then be evaluated and improved. Sustainable digital use therefore depends on integration into hospital organisation. This calls for attention to technical capacity, professional preparation, and institutional working rules.

2. Digital Health in Algeria: Readiness and the Requirements of Institutional Integration

Digital health initiatives in Algeria began before the pandemic. They included health information systems, electronic patient records, human resource management tools, and applications for service information and appointment booking. Their diversity does not necessarily amount to an integrated system. Patient-facing applications, such as DZDOC, SIHA-DZ, and Tabib Dz, help users access information and services. Internal systems manage data, resources, and the care pathway. Integration depends on a connection between these two levels. Digital access should therefore be reflected in the services that institutions actually deliver[15]

These initiatives developed in a national digital environment that changed over time. Algeria's E-Government Development Index (EGDI) declined between 2012 and 2016, then rose in later years[16] This trend provides a national context for digital transformation. It should not, however, be confused with readiness in the health sector. An overall index does not show how resources are distributed across hospitals or how consistently digital systems are used in medical and administrative work.

Table 1. E-Government Development Index in Algeria, 2012-2024

Year	Global rank	E-Government Development Index (EGDI)
2012	132	0.3608
2014	136	0.3106
2016	150	0.2999
2018	130	0.4227
2020	120	0.5173
2022	112	0.5611
2024	116	0.5956

Source: Prepared by the author using:

United Nations Department of Economic and Social Affairs, 'Algeria,' United Nations E-Government Knowledgebase, accessed October 16, 2025, https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/3-Algeria.

For the 2024 data, see also:

United Nations Department of Economic and Social Affairs, United Nations E-Government Survey 2024: Technical Appendix (New York: United Nations, 2024), 20, Table 2.1.

The table shows that e-government development in Algeria did not follow a steady upward path. The index fell from 0.3608 in 2012 to 0.2999 in 2016. Over the same period, Algeria's global rank declined from 132nd to 150th. Subsequent measurement rounds recorded improvement. By 2024, the index had reached 0.5956, although the country had fallen four places compared with 2022. This illustrates the difference between an improved index value and a country's relative position. The figures help describe the national context for digital health. They do not, however, establish the extent of digital integration in hospitals. That requires an assessment of routine use in clinical and administrative functions.

Figure 1 presents the two broad phases of this development between 2012 and 2024: decline followed by improvement. The chart complements Table 1 by showing the direction and pace of change across measurement rounds. It displays index values, whereas the table also reports global rankings.

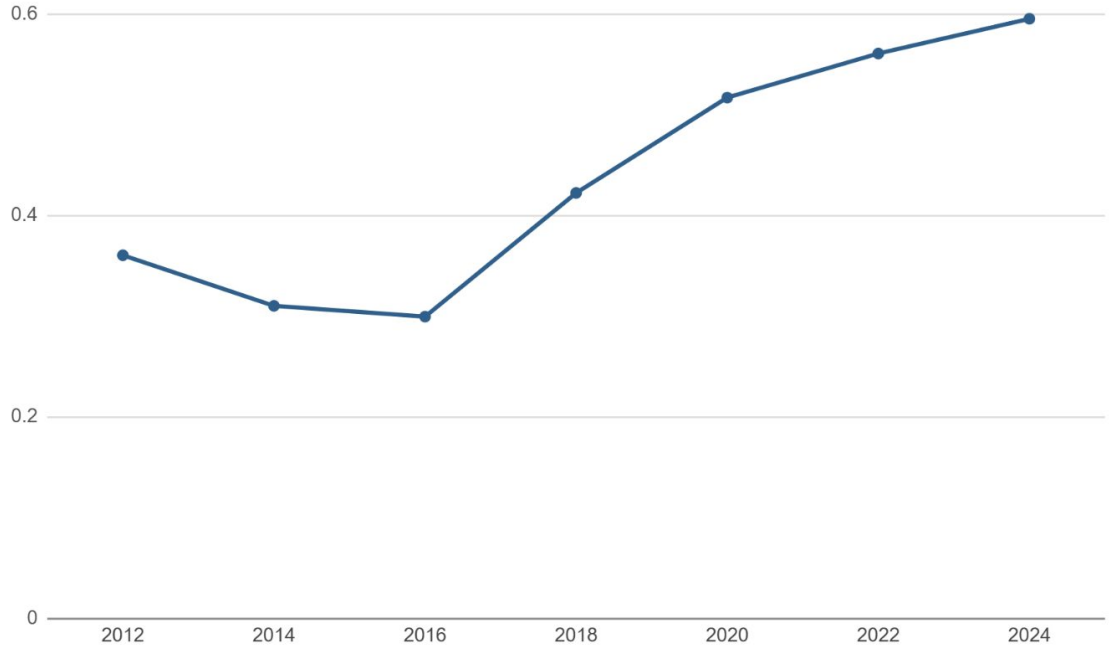


Figure 1. E-Government Development Index in Algeria, 2012-2024

Source: Prepared by the author from the data in Table 1.

An upward trend in the overall index is not enough to describe progress in digital readiness. Its components must also be considered. In 2024, Algeria recorded a Telecommunications Infrastructure Index value of 0.8129 and an Online Service Index value of 0.3320. This difference raises questions about the extent to which connectivity is accompanied by digital service development[17] The two indices measure different things, however. Their numerical gap cannot be treated as a direct measure of how efficiently technical resources are converted into services. It instead points to the need to examine the organisational and professional conditions behind that process.

In healthcare, this means distinguishing the availability of networks and equipment from the routine use of applications throughout a patient's care pathway. Online appointment booking can improve access to a service. Continuity of care also requires the appointment to connect with reception, examination, and follow-up. Likewise, digitising data in one department does not mean other departments can use those data. Integration depends on the uninterrupted flow of information across functions and organisational levels, not simply on the number of digital tools in place.

Institutional integration therefore requires sound data-management rules, interoperability, and staff capacity. Clear responsibility for entering, reviewing, and updating information provides a basis for its use. Connected systems allow information to move between work stages. Both depend on staff being able to use applications that suit their tasks and on support being available when problems arise. These relationships need to be examined in the field. National indicators alone cannot establish whether they exist in a particular hospital.

These considerations lead from an assessment of national digital readiness to an examination of digital use at the university hospital centre in Batna. The analysis draws on staff assessments of how well digital applications support their work and coordination during a health crisis.

Section Three. Digital Transformation and Health Crisis Management in Hospital Practice: The Case of Benflis Touhami University Hospital Centre in Batna

The case of Benflis Touhami University Hospital Centre in Batna makes it possible to move beyond the potential benefits of digital transformation. It allows an examination of how these tools operate in a hospital that faced the demands of COVID-19 crisis management. Information systems are used in several key departments, but their integration remains limited. This setting provides an opportunity to consider whether introducing digital applications is associated with a stronger institutional capacity to prepare, respond, and learn[18] The analysis has two parts. First, it examines digital readiness and the limits of actual use. Second, it examines the statistical relationship between digital transformation and crisis management, within the study's methodological limits.

1. Digital Readiness and the Limits of Its Use in Health Crisis Management

The field study used a questionnaire, interviews, and observation. It covered six departments at Benflis Touhami University Hospital Centre: emergency medicine, intensive care, epidemiology, the central laboratory, radiology, and the central pharmacy. The study population comprised 307 healthcare and administrative employees. A total of 101 valid questionnaires were obtained, giving a response rate of 32.9% of those distributed[19] Data were collected from October 5, 2025, to January 20, 2026. The assessment of the COVID-19 response was therefore retrospective[20]

Field data show that digital applications were used in several essential hospital functions. The laboratory information system received test requests, processed and validated results electronically, and made them available to departments connected to its database[21] A radiology information system supported requests, appointments, and the storage of examinations. Other applications managed medicine stocks and supported patient triage and routing in the emergency department. These tools were not linked through a complete, unified electronic patient record. Specific functions had been digitised, but the flow of healthcare information was not yet fully integrated[22]

The timing of implementation also matters when assessing the contribution of these applications to pandemic management. The laboratory and radiology information systems were in use before COVID-19. Triage arrangements were further developed in 2022. Implementation of an electronic medicine-ordering portal began in December 2024. These different dates make it essential to distinguish digital capabilities available during the pandemic from improvements made later. An assessment of the response should be based on tools used during the period concerned. Later developments can inform an analysis of institutional capacity. They should not be described as lessons learned from the pandemic without explicit evidence from interviews or documents. The chronology therefore helps prevent misleading conclusions about the link between digital transformation and crisis management.

The questionnaire results assess digital readiness across five dimensions: strategic orientation, the technical environment, human resources, culture, and governance.

Table 2. Levels of Digital Transformation Dimensions at the Hospital

Dimension	Mean (out of 5)	Standard deviation	Level
Digital strategic orientation	2.856	0.957	Moderate
Digital environment	2.738	0.856	Moderate
Digital human resources	2.594	0.773	Low
Digital culture and awareness	3.149	0.721	Moderate
Digital governance	2.963	0.835	Moderate

Table 2. Levels of Digital Transformation Dimensions at the Hospital *(continued)*

Dimension	Mean (out of 5)	Standard deviation	Level
Overall digital transformation	2.860	0.672	Moderate

Source: Author's analysis of questionnaire data and SPSS output, version 27.

Table 2 shows that the limitations of digital transformation are not solely technical. They also concern the human and organisational capacity to use digital resources. Digital human resources had the lowest mean score, while digital culture and awareness had the highest. This pattern may suggest a gap between recognising the importance of digitalisation and having the practical means to put it into use. Awareness alone does not ensure the skills, training, and assessment required for effective use. This interpretation is based on the distribution of responses. It is not an independent statistical test of the relationship between awareness and competence.

The gap is also visible in individual indicators of equipment, staff preparation, and resource allocation. The statement on providing all employees with the technical devices needed to perform their duties during COVID-19 had a mean score of 2.45. The statement on assessing staff competence in digital technologies during the outbreak recorded a mean of 2.50. The mean for allocating resources to support the digital transformation strategy during the crisis was 2.67[23]

Within the limits of respondents' assessments, these results show a difference between adopting digital priorities and providing the conditions to implement them. Reported weaknesses concern access to equipment, monitoring of user competence, and the mobilisation of resources to carry out the strategy.

These indicators do not mean that digital initiatives were absent. Rather, they point to their limited integration into routine procedures. A system used in one department may not be accessible to every staff member who needs it. Nor does it guarantee a continuous exchange of information with other departments. This issue is particularly relevant to the hospital studied. Systems were available in the laboratory, radiology, pharmacy, and emergency department, but they were not fully linked through a unified electronic patient record[24] The priority is therefore not just to add equipment. It is to connect the available applications within a coherent system of data, staff skills, and organisational responsibilities.

The questionnaire and interview findings indicate two levels of limitation. The first concerns staff capacity to understand and use digital tools. This is reflected in the low mean for digital human resources. The second concerns system integration and information exchange across the hospital. This is reflected in the absence of a complete unified electronic patient record. These findings cannot determine how much either limitation contributes to crisis management performance. They do, however, provide context for interpreting the relationship between digital transformation and pandemic management.

Digital readiness therefore involves more than the availability of applications. It also involves an institution's capacity to integrate them into consistent, connected work processes. Describing readiness is not enough to explain the role of digital transformation in crisis management. The analysis must also consider whether existing capabilities relate to the institution's ability to respond to the pandemic. In this sense, digital transformation is not simply a stock of technical resources. Its value depends on how those resources meet crisis management needs. This provides the basis for testing the statistical relationship between the two variables in the hospital studied.

2. Digital Transformation and Health Crisis Management: Statistical Relationships and Institutional Implications

The next step is to examine how digital readiness relates to crisis management. The analysis considers two questions. First, what is the overall association between digital transformation and COVID-19 crisis management? Second, how does the explanatory power of each digital transformation dimension differ in separate regression models? These results are interpreted alongside the observed limits of readiness. Statistical association is not treated as proof of causation.

The overall relationship was examined through simple linear regression. The total digital transformation score was the explanatory variable, and the total COVID-19 crisis management score was the dependent variable. Table 3 presents the model statistics used to examine the direction and explanatory power of the relationship in the sample.

Table 3. Simple Linear Regression of Crisis Management on Digital Transformation

Indicator	Value
Correlation coefficient (R)	0.733
Coefficient of determination (R^2)	0.537
Unstandardised regression coefficient	0.622
Regression intercept	1.347
F-statistic	114.858
F-test p-value	$p < 0.001$

Source: Author's analysis of questionnaire data and SPSS output, version 27.

Table 3 indicates a positive association between digital transformation and crisis management. The correlation coefficient was 0.733, and the unstandardised regression coefficient was 0.622. In the estimated model, a one-unit increase in the digital transformation score is associated with an expected increase of 0.622 units in the crisis management score. The F-statistic was 114.858 ($p < 0.001$), indicating that the model was statistically significant. These results support a positive linear relationship in the sample. They do not, on their own, establish a direct causal effect.

The coefficient of determination was $R^2 = 0.537$. The model therefore explains 53.7% of the variation in questionnaire-based crisis management scores within the sample. This percentage concerns variation in the questionnaire scores. It does not indicate improvement in healthcare performance or a reduction in mortality or waiting times. The findings show an association between respondents' assessments of digital transformation and their assessments of crisis management. They are insufficient to demonstrate a direct causal effect on health outcomes.

This association is consistent with the descriptive findings. A moderate overall level of digital transformation can still be positively associated with crisis management. Mean scores describe the availability of digital capabilities. Regression, by contrast, examines how differences in digital transformation scores relate to differences in crisis management scores. Incomplete digital transformation therefore does not rule out an institutional relationship. The interpretation must take account of what resources exist and how they are used.

The overall model does not show how the association differs across digital transformation dimensions. Separate simple linear regressions were therefore examined. Each model relates one digital transformation dimension to the total crisis management score.

Table 4. Separate Simple Linear Regression Models for Digital Transformation Dimensions and Crisis Management

Explanatory dimension	Correlation (R)	R^2	Unstandardised coefficient
Digital strategic orientation	0.678	0.459	0.404
Digital environment	0.522	0.273	0.348
Digital human resources	0.539	0.291	0.398
Digital culture and awareness	0.611	0.374	0.483
Digital governance	0.610	0.372	0.417

Source: Author's analysis of questionnaire data and separate simple linear regression models in SPSS, version 27.

All five dimensions showed positive relationships with crisis management, but their models differed in explanatory power. Digital strategic orientation had the highest R^2 (0.459). It was followed by digital culture and awareness (0.374), digital governance (0.372), digital human resources (0.291), and the digital environment (0.273). The association with crisis management therefore extends beyond technical infrastructure. Strategic, human, and organisational dimensions also matter in the observed relationships.

Digital strategic orientation is particularly notable in this comparison. Higher scores on this dimension were associated with higher crisis management scores. Its model explained 45.9% of the variation in the dependent variable. This does not prove that strategic orientation has the strongest independent effect. Each model examined only one dimension and did not control for the others. The R^2 values therefore rank the explanatory power of separate models, not the independent contributions of the dimensions. They must not be added together, since the variation they explain may overlap.

The digital human resources dimension illustrates why descriptive and regression findings should be read together. It had the lowest mean among the digital transformation dimensions (2.594). Its correlation with crisis management was 0.539, and the R^2 of its model was 0.291. These findings indicate limited human digital capacity alongside a positive association with crisis management scores. The low mean should not be interpreted as evidence that human resources are unimportant. It identifies an area of weakness that deserves attention when setting development priorities.

The similar R^2 values for digital culture and awareness and for digital governance also point to the institutional nature of the relationship. This does not mean that the two dimensions play identical roles or can replace one another. Each measures a different aspect of digital transformation. The findings therefore extend the analysis beyond equipment to staff awareness and the rules governing digital use. However, they do not statistically establish an interaction between these dimensions or identify each one's independent contribution.

The combined findings suggest three related areas for institutional action: setting clear priorities for digital tools, strengthening staff capacity to use them, and establishing rules for their use and for data exchange. These priorities are derived from the observed dimension scores and associations. They are not interventions whose effectiveness has been tested experimentally. Their proposed connection is an analytical view of digital transformation, not the result of a statistical interaction test.

The results support a positive correlation between digital transformation and health crisis management in this sample. Their interpretation remains limited by the research design. The study relies on retrospective staff assessments from a single hospital, with a response rate of 32.9%. It cannot follow changes in digital capacity and performance during each stage of the pandemic or isolate other influences. It is also necessary to distinguish systems used during the crisis from those developed later. The hospital's digital situation at the time of fieldwork cannot be used to attribute crisis management outcomes to every application then available. The models support an association, but neither its causal direction nor the independent contribution of each dimension can be determined.

Within these limits, the study suggests that the link between digital transformation and health crisis management depends on more than the presence of applications. It also depends on their integration into institutional work. The positive correlation appeared alongside moderate digital readiness and comparatively weak digital human resources. Incomplete transformation does not remove the association, but it may limit the use of existing capabilities. The main challenge is therefore not only to increase equipment. It is to build institutional capacity through staff development, connected systems, and clear rules of use. These directions are supported by the field assessment. They do not represent proven independent causal effects on performance.

Conclusion

The study found a positive, statistically significant relationship between digital transformation and COVID-19 crisis management at Benflis Touhami University Hospital Centre in Batna. This supports the research hypothesis within the limits of the sample and design. The main findings are as follows:

- The overall level of digital transformation was moderate (mean = 2.860). Digital culture and awareness had the highest mean (3.149), while digital human resources had the lowest (2.594). This difference suggests a gap between awareness of digitalisation and the practical capacity to use it.
- Information systems were available in key hospital departments, but they were not fully integrated through a unified electronic patient record. Digitising specific functions is therefore distinct from building a connected institutional information system.
- The correlation between digital transformation and crisis management was 0.733, with $R^2 = 0.537$ ($p < 0.001$). Higher digital transformation scores were associated with higher crisis management scores. This does not establish a 53.7% causal improvement in healthcare performance.

- All five dimensions were positively associated with crisis management. The separate model for digital strategic orientation had the highest explanatory power ($R^2 = 0.459$). This does not rank the dimensions by independent causal effect, since separate simple regressions were used.

The findings also show that limited digital readiness does not negate its association with crisis management. Instead, it points to weaknesses that need attention. Priorities should include staff training, system interoperability, and clear responsibility for digital use and monitoring. Digital transformation should not be reduced to purchasing more equipment. Investment in people is essential because staff connect technology with healthcare practice. Digital tools should support healthcare teams and patients, rather than add procedures that are disconnected from care needs.

These conclusions are limited to one hospital and to retrospective data based on staff responses. This restricts generalisation and causal inference. Within these limits, the study offers field evidence for setting digital development priorities. Future research could compare hospitals and use operational performance indicators that also capture patient experience.

References

I. Sources Originally Published in Arabic

1. Al-Najjar, Shahnaz Fadel Ahmed, et al. 'Electronic Administration as a Strategic Approach to Crisis Management: An Applied Study at the General Company for Electric Power Transmission, Northern Region, Ministry of Electricity' [in Arabic]. Journal of Administration and Economics, no. 131 (2021): 116-135.
2. Hasrouri, Lotfi. 'Aspects of Digital Technology Use in Health: A Study of Selected International Experiences' [in Arabic]. Journal of Human Sciences 24, no. 2 (2024): 321-338.

II. Sources in Other Languages

1. 10. Snoussi, Zoulikha. 'Le système de santé algérien face à la crise sanitaire du COVID-19: quels enseignements sur ses défaillances?' Les Cahiers du CREAD 36, no. 3 (2020): 373-396.
2. 11. United Nations Department of Economic and Social Affairs. 'Algeria.' United Nations E-Government Knowledgebase. Accessed October 16, 2026. https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/3-Algeria.
3. 12. WHO Regional Office for Europe. Strengthening the Health System Response to COVID-19: Creating Surge Capacity for Acute and Intensive Care. Technical Working Guidance No. 2. WHO/EURO:2020-670-40405-54163. Copenhagen: WHO Regional Office for Europe, 2020.
4. 13. Wokurka, Guido, Yvonne Banschbach, Dominic Houlder, and R. Jolly. 'Digital Culture: Why Strategy and Culture Should Eat Breakfast Together.' In Shaping the Digital Enterprise: Trends and Use Cases in Digital Innovation and Transformation, 109-120. Cham: Springer International Publishing, 2016.
1. Aligne, Florence, and Juliette Mattioli. 'The Role of Context for Crisis Management Cycle.' In Supporting Real Time Decision-Making, edited by Frada Burstein, Patrick Brézillon, and Arkady Zaslavsky, 113-132. Springer, 2010.
2. Burkle, Frederick M., Jr. 'Challenges of Global Public Health Emergencies: Development of a Health-Crisis Management Framework.' The Tohoku Journal of Experimental Medicine 249, no. 1 (2019).
3. Elsafty, Ashraf, and Amal Yehia. 'Digital Transformation Challenges for Government Sector.' Business and Management Studies 9, no. 1 (2023).
4. Ismail, M. H., M. Khater, and M. Zaki. Digital Business Transformation and Strategy: What Do We Know So Far? Cambridge Service Alliance, 2017.
5. Luburić, Radoica. 'A Model of Crisis Prevention (Based on Managing Change, Quality Management and Risk Management).' Journal of Central Banking Theory and Practice 8, no. 2 (2019): 33-49.
6. Marre, Fabien. 'La préparation des établissements de santé à la gestion de crise: limites, enjeux et perspectives en Lot-et-Garonne.' Mémoire de formation d'Inspecteur de l'Action Sanitaire et Sociale, École des hautes études en santé publique, 2010.
7. Murawski, M., and M. Bick. 'Digital Competences of the Workforce—A Research Topic?' Business Process Management Journal 23, no. 3 (2017): 721-734.

8. Paul, Jijo. 'Strategies for Effective Crisis Management in Healthcare Systems: Patient Safety and Lessons Learned.' Medical Research Archives 12, no. 7 (2024).
9. Salmi, Madjid, Amirouche Bouchelaghem, and Samya Mohellebi. 'Le système de santé en Algérie face au développement du numérique: le dossier du patient informatisé. Cas du CHU de Tizi-Ouzou.' Revue Française d'Économie et de Gestion 3, no. 5 (2022).

III. Interviews and Field Sources

1. Head of the Central Pharmacy Department. Interview conducted by the author, Benflis Touhami University Hospital Centre, Batna, October 20, 2025.
2. Head of the IT Department and Digitalisation Officer. Interview conducted by the author, Benflis Touhami University Hospital Centre, Batna, October 15, 2025.
3. Head of the Laboratory Department. Interview conducted by the author, Benflis Touhami University Hospital Centre, Batna, October 20, 2025.
4. Head of the Radiology Department. Interview conducted by the author, Benflis Touhami University Hospital Centre, Batna, October 20, 2025.

Notes

[1] Ismail, M. H., Khater, M., and Zaki, M., 'Digital Business Transformation and Strategy: What Do We Know So Far?' Cambridge Service Alliance 10, no. 1 (2017): 1-35, p. 6.

[2] Hasrouri et al., 'Aspects of Digital Technology Use in Health: A Study of Selected International Experiences' [in Arabic], Journal of Human Sciences 24, no. 2 (2024), pp. 325-330.

[3] Murawski, M., and Bick, M., 'Digital Competences of the Workforce—A Research Topic?' Business Process Management Journal 23, no. 3 (2017): 721-734, pp. 721-726.

[4] Wokurka, Guido, Yvonne Banschbach, Dominic Houlder, et al., 'Digital Culture: Why Strategy and Culture Should Eat Breakfast Together,' in Shaping the Digital Enterprise: Trends and Use Cases in Digital Innovation and Transformation (Cham: Springer International Publishing, 2016), 109-120, pp. 109-113.

[5] Elsafty, Ashraf, 'Digital Transformation Challenges for Government Sector,' Business and Management Studies (2023), pp. 15-16.

[6] Marre, Fabien, 'La préparation des établissements de santé à la gestion de crise: limites, enjeux et perspectives en Lot-et-Garonne,' mémoire de formation d'Inspecteur de l'Action Sanitaire et Sociale, École des hautes études en santé publique, March 2010, p. 2.

[7] Burkle, Frederick M., Jr., 'Challenges of Global Public Health Emergencies: Development of a Health-Crisis Management Framework,' The Tohoku Journal of Experimental Medicine 249, no. 1 (2019), pp. 35-36.

[8] Aligne, Florence, and Juliette Mattioli, 'The Role of Context for Crisis Management Cycle,' in Supporting Real Time Decision-Making, ed. Frada Burstein, Patrick Brézillon, and Arkady Zaslavsky, 'From Crisis Management Concept to Crisis Management Support' (2010), 113-132, pp. 114-121.

[9] Paul, Jijo, 'Strategies for Effective Crisis Management in Healthcare Systems: Patient Safety and Lessons Learned,' Medical Research Archives 12, no. 7 (2024).

[10] Al-Najjar, Shahnaz Fadel Ahmed, et al., 'Electronic Administration as a Strategic Approach to Crisis Management: An Applied Study at the General Company for Electric Power Transmission, Northern Region, Ministry of Electricity' [in Arabic], Journal of Administration and Economics, no. 131 (2021): 116-135.

[11] Luburić, Radoica, 'A Model of Crisis Prevention (Based on Managing Change, Quality Management and Risk Management),' Journal of Central Banking Theory and Practice 8, no. 2 (2019): 33-49, pp. 45-46.

[12] Snoussi, Zoulikha, 'Le système de santé algérien face à la crise sanitaire du COVID-19: quels enseignements sur ses défaillances?' Les Cahiers du CREAD 36, no. 3 (2020): 373-396, p. 379.

[13] Ibid., pp. 381-383.

[14] WHO Regional Office for Europe, Strengthening the Health System Response to COVID-19: Creating Surge Capacity for Acute and Intensive Care, Technical Working Guidance No. 2, WHO/EURO:2020-670-40405-54163 (Copenhagen: WHO Regional Office for Europe, 2020), section 'Strategic action 4'.

[15] Salmi, Madjid, Amirouche Bouchelaghem, and Samya Mohellebi, 'Le système de santé en Algérie face au développement du numérique: le dossier du patient informatisé. Cas du CHU de Tizi-Ouzou,' Revue Française d'Économie et de Gestion 3, no. 5 (2022), pp. 147-149.

[16] United Nations Department of Economic and Social Affairs, 'Algeria,' United Nations E-Government Knowledgebase, accessed October 16, 2025, https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/3-Algeria.

[17] United Nations Department of Economic and Social Affairs, op. cit.

[18] Head of the IT Department and Digitalisation Officer, interview conducted by the author, Benflis Touhami University Hospital Centre, Batna, October 15, 2025.

[19] Head of the Laboratory Department, interview conducted by the author, Benflis Touhami University Hospital Centre, Batna, October 20, 2025.

[20] Field study records on questionnaire distribution, collection, and data collection dates, Benflis Touhami University Hospital Centre, Batna, October 5, 2025-January 20, 2026.

[21] Head of the Laboratory Department, same interview.

[22] Head of the IT Department and Digitalisation Officer, interview conducted by the author, Benflis Touhami University Hospital Centre, Batna, October 15, 2025.

[23] Field questionnaire data on access to technical equipment, assessment of staff digital skills, and resources allocated to the digital transformation strategy; analysed using SPSS, version 27.

[24] Head of the IT Department and Digitalisation Officer, interview conducted by the author, Benflis Touhami University Hospital Centre, Batna, October 15, 2025.