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Paradox of Digital Adaptation: Exploring the Antecedents of Technostress among Female Nurses in Bangladesh

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Abstract- **In the wake of technological advancements, there is increased recognition that digitalizing healthcare brings significant cost reductions, improved efficiency, and sustainability. Bangladesh, a South Asian developing economy, is paving its way to digitalizing healthcare. Given that female nurses are a crucial component of Bangladesh's healthcare workforce, understanding antecedents of technostress for nurses is essential for the effective implementation of healthcare digitalization. Thirty female nurses from public and private hospitals were interviewed. Findings suggest that technological inertia persists among most senior nurses; however, their awareness of the positive impact of digital tools on patient care creates a cognitive dilemma. Although many younger nurses demonstrated strong willingness to embrace digitalization, such willingness is often obstructed by insufficient infrastructural support and training. For both younger and senior nurses, their motivation to engage with digital health technologies is influenced by patients' digital literacy and colleagues' fear of technology. Lack of standardized process across the country and technical glitches also create frustration among the nurses. It is anticipated that this study's findings can help relevant policymakers by highlighting the multidimensional interaction among nurses' technostress, organizational support, and patients'/colleagues' technological adaptability; thereby guiding the development of context-sensitive policies.**

Keywords: **Developing Economies, Healthcare, Nurses, Tech Adaptability, Technostress**

I. INTRODUCTION

The contemporary workplace is characterized by technological advancements primarily driven by ubiquitous internet connectivity, artificial intelligence, and other technological innovations [1]. Consequently, such rapid technological advancements are bringing continuous changes in different spheres of work and people management. While technology's influence can be observed across various industries, technological change and digitalizing healthcare remain crucial, considering the significance of the industry on individual and societal well-being. Smart healthcare solutions, crucial for sustainable healthcare systems, are being enabled by the automation and digitalization pioneered by two core driving technologies: the Internet of Things (IoT) and Artificial Intelligence (AI) [2]. There is increasing consensus that traditional health record systems might be more effectively replaced by digital health systems and other health information technology, particularly in nations with low incomes [3]. Continuous technological progress in healthcare is crucial not only for advanced medical treatment but also for sustainable healthcare through reduced cost and enhanced efficiency [4]. Policymakers are hence advocating for streamlining treatment, record management, and other relevant processes by adopting digital technologies [5].

Technology, however, regardless of the sector in which it is implemented, is characterized by its duality-that is, beneficial and adverse effects [6]. While technological advancements and digital integration are crucial for a sustainable healthcare system, the adoption of such advancements by healthcare professionals remains a major challenge. Technology in healthcare, or Healthcare Information Technology, can be critically regarded as a double-edged sword by health professionals [7]. Technology's adverse effects in the form of technostress (psychological distress caused by interacting with technology) remain a central topic of discussion in the literature of technology and people management [8] [9].

Bangladesh, a South-Asian emerging economy, has been working on integrating technology in various aspects, including healthcare. The country is being transformed into a modern technology-based country with automation and control technology being applied in various industries [10].

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Bangladesh has embarked on the implementation of several digital health initiatives over the last few years [11] [12]. Following the resolution of the World Health Assembly (WHA), Bangladesh initiated the development of a digital health strategy in 2019 [13]. Despite such progress, Bangladesh's healthcare system still faces deep-seated challenges, including accessibility, doctor-to-patient ratio, skill gap, etc. [14]. Technology in its various forms can help overcome the major challenges prevailing in Bangladesh's healthcare sector [15] [16]. To ensure proper implementation of digital technologies in Bangladesh's healthcare sector, understanding its impact on healthcare professionals is essential.

Among hospital personnel, nurses constitute the core workforce, representing 50% of the global healthcare workforce [17]. Nurses have a critical role in patient safety, especially when it comes to disease prognosis, medication administration, and vital sign monitoring [18]. As of 2023, Bangladesh had only 85,000 nurses, whereas the number of doctors is much higher than that of the nurses [19]. Although nurses are an essential component of the healthcare system in Bangladesh, they continue to encounter difficulties in keeping pace with technological advancements [20]. The technostress emerging from the involvement with healthcare technology can prove to be detrimental to nurses' well-being, which in essence can affect nurses' adaptability to technological changes in healthcare. The authors argue that understanding the antecedents of technostress among nurses can help policymakers explore the reasons behind the disinclination of nurses towards technological changes.

The present study's contribution to the existing literature is threefold. Firstly, the study fills a methodological gap by taking a qualitative approach in understanding the antecedents of technostress among the female nurses in Bangladesh. Existing studies focused on technostress among nurses have largely been quantitative [9] [16] [20]. A qualitative approach helped the authors unearth the experiences of the nurses and explore the antecedents of the technostress. Second, existing studies on technostress among nurses have either focused on examining the impact of technostress on nurses' job outcomes, for instance, job satisfaction [16], or focused on the influence of social support (supervisor and colleagues) on nurses' technology adaptation [21]. However, the present study, instead of focusing on the consequences of the technostress, aims to explore the antecedents of the technostress among the nurses. Third, studies on technostress among the nurses in South Asian economies, where digitalization of healthcare remains at a nascent stage, are limited. Moreover, cultural components can potentially influence how various factors related to healthcare technologies can lead to technostress. Although digitalisation offers numerous opportunities and advantages to the healthcare sector in developing economies, its execution frequently encounters challenges that are sensitive to the specific context, hindering its overall effectiveness [4]. Hence, it is anticipated that insights from the present study can help policymakers identify the context-specific (considering the cultural elements and technological readiness) factors that can influence efficient adaptation of healthcare technologies among the Bangladeshi nurses.

The paper is further organized into the following sections. In the next section, the paper highlights the literature review on technostress and digital healthcare in Bangladesh. Before discussing the key findings of the study, the authors detail the research methodology.

II. LITERATURE REVIEW

A.Technostress

Organizational stress has garnered significant attention in academic research over the years, as it significantly impacts business performance and overall success. The swift progress in technology has led to issues regarding technostress, a psychological condition that individuals face due to work automation [8]. The term 'technostress' was introduced by Reference [22] as "a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner." (pg. 16).

Technostress has been defined as a kind of stress an individual experiences resulting from psychological difficulties while using information and communication technologies [23]. It reflects an experience when technology users feel psychological distress and discomfort since they cannot adapt to new technologies, creating a negative perception towards the technology [24]. Technostress encompasses perception, emotion, and thought in the post-Information System (IS) implementation in organisations and the prevalent use of IT in society [25].

Technostress can lead to several adverse outcomes for individuals. These impacts can be seen in their actions, including decreased productivity, diminished performance, and a wish to resign from their position [26] [27], as well as in their mental health, such as feelings of job dissatisfaction [28].

Health practitioners such as nurses are particularly impacted by issues related to technological change and the need for continuous skill updates. Specifically, concerns such as technology changes, updating computer and technology networks, and the fear of job loss due to inadequate technology skills tend to have an adverse effect on nurses' well-being and job performance [8].

B. Digitalizing Healthcare in Developing Economies

In emerging economies, the healthcare sector is under growing pressure to modernize its disjointed paper-based systems to capitalize on the various advantages that digitalization offers [4]. However, the lack of contextual understanding and systematic approaches to obtaining digitalisation are the major bottlenecks affecting its

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successful deployment in developing economies [29]. For more than two decades, numerous developing nations have tried to digitalize their health management information systems (HMIS) but have experienced only limited success in achieving sustainability [30]. Numerous digitalization initiatives frequently fall short of achieving their goals [31]. Such failures are commonly linked to the inherent complexity of the situation [32] and the intricate relationship between context and actions that underpin the digitalization journey [31]. This complexity is marked by gaps in infrastructure as well as the diversity and interconnectedness of the actors and agendas present among political, public, third sector institutions, and global entities [33].

C. Digitalizing Healthcare in Bangladesh

In developing nations like Bangladesh, technology in the form of AI offers promising solutions to address public health challenges, such as infectious diseases like COVID-19 and dengue, while contributing to economic growth [2]. Over the last decade, Bangladesh has undergone significant technological advancements and changes in the healthcare sector. This includes the development and implementation of District Health Information Software 2 (DHIS2), Digital Dashboard, Shared Health Record (SHR) system, National Health Data Warehouse, Digital Health Hub, Civil Registration and vital statistics (CRVS) system, Video Conferencing, Bulk Messaging Service, Telemedicine, Teleconsultation, E-prescription, and E-referral [11] [12].

The National Digital Health Strategy (2023-2027) is setting the stage for diagnostics powered by AI, immediate disease monitoring, and data-driven management systems in hospitals, ensuring effective and accessible healthcare to countless individuals [14]. An online-based HRIS (Human Resource Information System) has also been developed to capture health workforce information, applicable for all Directorates, under the Ministry of Health and Family Welfare [34]. Mobile health apps are also being developed, paving the way for telemedicine services and online pharmacies, hence, enhancing healthcare access for remote populations [14]. However, Bangladesh's healthcare system remains in the nascent stage of digitalization, with substantial scope for further development [12].

Bangladesh's current state of healthcare digitization was evaluated using the Global Digital Health Index, which serves as a national 'digital health scorecard' that measures the maturity of various components of digital health within the country. Based on this assessment, leadership, governance, workforce, infrastructure, service, and application are currently in the 'Scaling Up' stage, while other areas remain in the 'Developing and Building Up' stage [34]. The authors of the present research argue that workforce preparedness is an essential determinant of the successful digitalization of healthcare in Bangladesh. Technostress remains a crucial factor that can potentially impact the readiness of healthcare professionals. And, hence, further exploration of antecedents of technostress among the healthcare professionals, such as nurses, becomes imperative.

III. METHODOLOGY

A. Research Approach

The present study aims to explore the antecedents of technostress among the female nurses in private hospitals in Bangladesh. Considering the explorative nature of the study, the authors took an inductive approach with qualitative data. A primary tenet of the qualitative approach is its emphasis on contextual understanding; that is, the interpretation of participants' "*behaviour, values, beliefs, and so on"* through the lens of the specific context in which the research study is conducted [35]. Exploration of the antecedents of technostress among the female nurses in Bangladesh required contextual understanding and interpretation of the context through the lens of the participants. Hence, a qualitative approach seemed the perfect fit considering the research objective.

B. Data Collection & Sampling

Data was collected from in-depth interviews with 30 nurses from public and private hospitals in Bangladesh. All the nurses were female, aged between 25 and 40 years old. According to a recent report by the Health Sector Reform Commission, there are 56,734 nurses available in Bangladesh [36]. And according to Reference [37], most nurses are female. Considering this, this study focused on exploring the antecedents of technostress among the female nurses in Bangladesh. The concept of data saturation, which is the point at which no new information or themes are observed in the data from the completion of additional interviews or cases, is a useful one in terms of discussing sample size in qualitative research [38]. The sample size of 30 nurses thus seemed appropriate, as the researchers started to observe the emergence of repetitive themes, indicating data saturation after interviewing 25 nurses.

A semi-structured questionnaire was used for the in-depth interviews. The data was initially collected in Bengali, the native language of the nurses. Collecting the data in the native language allowed the participants to express their lived experiences with greater nuance.

C. Data Analysis

Thematic analysis was conducted in the study. The inductive approach allowed the themes to emerge from the transcripts. At first, the researchers familiarize themselves by repetitively reading the transcripts. The initial codes were generated from the transcripts, which highlighted the significant features of the data set. Next, the codes were analysed to find overarching themes and sub-themes. The data analysis process was facilitated using NVivo 15.

D. Ethical Considerations

Considering the ethical aspects of the research, the authors ensured that participants' identities were kept anonymous.

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Before starting the interviews, the participants were informed about the objectives and motivations of the research.

IV. FINDINGS

In total, eight themes emerged from the coding and analysis of the qualitative data.

A. Lack of Standardized IT-related Process across the Country

While sharing their experiences with technology at work, most of the nurses highlighted that there is a lack of standardized Information Technology (IT) across different hospitals in the country. Most of the nurses studied had work experience in other hospitals before joining their current workplace. It has been observed that when nurses had to go through a transition because of the IT infrastructure and state of technology utilization between their previous and new hospitals, it created a stressful situation for them. For instance, one of the participants who moved to a public hospital (which uses a manual approach for patient data management) from a private hospital (which uses a digital approach in patient record management) was found to be frustrated.

B. Fear of Replacement & Lack of Awareness about the Digitalization

One of the major themes that emerged from the analysis is the 'fear of replacement'. It was observed that one of the major reasons behind the reluctance to digitalization was related to the nurses' fear of being replaced. However, it is worth noting that fear of replacement among the nurses prevailed mostly because there was a lack of awareness among them on how digitalization would affect their jobs. Most of the nurses who were not exposed to various forms of healthcare digitalization were found to be unaware of how digitalization was changing the healthcare systems. It resulted in a fear of using technology among the nurses. Such unawareness and evoked fear were found to be a major reason behind those nurses' scepticism towards healthcare digitalization and technostress.

C. Distrust towards Technology

One of the major antecedents of technostress among the nurses studied was their distrust of technology. Many of the participants studied demonstrated distrust towards technology in terms of ensuring patient care. Moreover, they were especially concerned about how their demographic and work performance data were being used. For instance, one of the participants mentioned,

"*Some of the nurses were also concerned about patients' data security. Such distrust was found to develop technostress among the nurses studied*."

Moreover, some of the participants were also concerned about patients' data security. Such distrust was found to develop technostress among the nurses studied.

D. Contagious Anxiety

Analysis of the data suggests a contagious effect of techno-anxiety and mistrust within the nurses studied, wherein the apprehensions of one individual could propagate, thereby fostering a vicious cycle of technostress.

E. Patient's Adaptability to Technology

Many of the nurses were found to be negatively affected when their patients struggled to adapt to the digitalization of healthcare. According to these nurses, many patients in Bangladesh are still not comfortable with digital healthcare services. Hence, the nurses have to put in additional effort in managing patients who are not technologically savvy. Such findings were especially relevant to the younger nurses who themselves are comfortable with healthcare digitalization.

F. Lack of Infrastructural Facilities & Training

Findings suggest that nurses experienced technostress when exposed to infrastructural barriers. Many nurses experienced technostress at work when they did not have the proper infrastructure to facilitate the digitalization of healthcare. Moreover, lack of training on digitalization was another major antecedent of technostress among the nurses studied. In some cases, where the hospital provided proper training and had sufficient machines and equipment, poor internet connectivity disrupted the digitalization process, leading to technostress among the nurses.

G. Technical Error & Glitch

Working with digital systems, especially in digital data management (for patients), nurses experienced technostress due to system crashes and other technical issues. While most of the nurses acknowledged that such technical issues or glitches are inevitable, these nevertheless caused technostress among many of the nurses studied. For instance, one of the participants mentioned,

"*There were also technical challenges, occasional system crashes, and slow internet, which caused delays and frustration. Also, when we informed the authorities about these issues, it took a lot of time to replace these machines*."

V. DISCUSSION, IMPLICATIONS & CONCLUSION

Technostress remains a crucial obstacle in the successful implementation of healthcare digitalization in Bangladesh. Findings of the present study highlight the major antecedents of technostress among the female nurses in Bangladesh.

Findings of the present study identify some organization-specific and some employee-specific factors that can lead to technostress among the nurses. Existing studies focusing on technostress among nurses, especially in Bangladesh, have specifically explored the roles of collegial and supervisory support on technostress [20]. On the other hand, existing studies have also examined the impact of technostress on the nurses and other healthcare professionals' physical and mental well-being. Insights from the present study extend the literature by exploring the antecedents of technostress

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among Bangladeshi nurses. Findings suggest that technostress among the female nurses in Bangladesh results from organizational and individual-level factors. While fear of replacement because of technology remains one of the major antecedents of technostress in existing studies, the present study highlights the contagious anxiety and discusses how one individual with a fear of technology can have a negative influence on his or her colleagues, resulting in a vicious cycle of apprehension towards healthcare digitalization.

Being a developing economy, Bangladesh continues to struggle with technological, infrastructural, and financial challenges. And such impact limitations can be reflected in the digitalization of the healthcare sector as well. Despite these challenges, the country has made tremendous progress in digitalizing various aspects of healthcare. The infrastructural and technical barriers were found to be one of the major antecedents of technostress among the nurses.

Moreover, a lack of awareness among Bangladeshi nurses on the impact of healthcare digitalization emerged as one of the major themes in this study. Addressing such unawareness is crucial, as such unawareness can create negative perceptions towards digitalization, affecting nurses' adaptability, and can also lead to technostress.

Future studies can investigate the impact of the novel antecedents (for instance, identified by this study. It is anticipated that insights from this study can help policymakers identify the antecedents of technostress among the female nurses in Bangladesh, with special consideration to factors associated with the contemporary workplace.

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