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Gender disparity in telehealth usage in Bangladesh during COVID-19

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ABSTRACT

Background and aims: Telehealth allows healthcare workers to see patients virtually in locations that were not accessible previously, which has reduced cost and time and saved lives. The research aims to examine gender disparity among telehealth usage during the pandemic in 2020. This study will leverage a timely national experiment to evaluate the users of telehealth across the Bangladeshi population.

Methods: We obtained de-identified data for 200 patients among outpatient telehealth visits from Global Health Data Exchange as it captured telehealth use throughout Bangladesh.

Results: The analysis showed that male patients had a higher dependency on telehealth than female patients. 14% of the female patients opted for telehealth visits only with 57% cases of missed doses of medication, compared to males with 20% of them choosing telehealth visits and 29% missing their doses of medication. We found that the youngest age group, 16–25, had the highest dependence on telehealth compared to any other age group, and the lowest dependence was among the oldest age group of 45 years and above.

Conclusions: There was a strong association between telehealth use and gender disparity with p value = 0.02 < 0.05. Longitudinal and geographical data are needed to understand more about the gender disparities and impact in telehealth utilizations.

1. Introduction

Telehealth uses electronic information and technologies to support long-distance healthcare services from healthcare workers to patients remotely at any time and place. Bangladesh is a developing country with only 6 doctors per 10,000 patients (Al-Zaman, 2020). The healthcare sector is heavily focused in Dhaka, the capital city of Bangladesh. However, 64% of the population resides in rural areas, and patients need to travel long distances to access healthcare services (LightCastle Partners, 2020). Telehealth allows healthcare workers to see patients virtually in locations that were not accessible previously, which has reduced cost and time and saved lives. With 60.3% of the total market as of 2019, North America is currently the largest telehealth market and is expected to remain so until 2025; however, the Asian market is predicted to grow fast (Al-Zaman, 2020).

Bangladeshi Telehealth practices began in 1999 through the Center for Rehabilitation of Paralyzed (CRP) by Swinfen Charitable Trust of the UK (Vassallo et al., 2001) which used store and forward-based

telemedicine with digital cameras for taking images, but no real-time technology was applied. However, lack of marketing, poor logistics, and little connectivity meant that this approach did not succeed. In 2020, the COVID-19 pandemic led both government and non-government bodies to initiate telehealth for delivering patient care all over the country. Through a public project under the Directorate General of Health Services (DGHS), high-quality telehealth services were established at Bangabandhu Sheikh Mujib Medical University and the National Institute of Cardiovascular Diseases with 3 district hospitals (Shatkhira, Nilphamari, and Gopalganj) and 3 sub-district hospitals (Pirgonj, Dakope and Debhata) (LightCastle Partners, 2020). Among private projects, Praava Health, Evercare, Maya, and Telenor Health are some of the successful hospitals and organizations leading telehealth services in Bangladesh.

Although few people used telehealth services in the pre-COVID-19 period, the pandemic has led to a significant rise in telehealth services in Bangladesh. During the initial outbreak, the covid-19 testing rate in Bangladesh was only 0.34%, the second-lowest in South Asia, only after

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the war-torn nation-Afghanistan (Al-Zaman, 2020). This also led people to stay home and seek medical assistance through virtual channels as many wanted to prevent the virus (Al-Zaman, 2020; Amit, Barua, & Kafy, 2021). During the pandemic, a rising percentage of individuals in Bangladesh turned to telehealth as it may provide more convenience and access to care for online consultations while minimizing the risks of virus transmission that may result from going to a healthcare provider. However, little is known about the gender disparity in accessing or using telehealth services in the country's urban and rural areas. This study will leverage a timely national experiment to evaluate the impact of telehealth across the Bangladeshi population, where 49% of them are female (Trading economies, 2021). Despite the overall growth in telehealth in this country, it is unclear whether telehealth utilization increased for patient populations for both genders in 2020.

The research question will examine if there was any gender disparity among telehealth users in Bangladesh during the COVID-19 pandemic in 2020? The significance of the research question lies in assessing the fact that telehealth use is experiencing unprecedented growth. However, telehealth users' demographics are unclear in Bangladesh. The research question aims to assess the demographics of telehealth use and analyze gender disparity and health inequality in telehealth usage during the pandemic in 2020.

2. Conceptual framework

The conceptual framework discusses hypothesized associations of gender that affect health outcomes. In the socioeconomic and demographic factors, the phenomenon indicates a patient's absolute and relative position in society, including prestige, education, occupation, and wealth. For example, employment provides income, which influences choices of housing (residential and community), relationships among friends and family, food, medical care, and more. However, employment depends on education because the higher the education a person attains, the better employment opportunity the person will typically receive. Employment sometimes depends on the gender/sex of an individual, considering there is a glass ceiling for women in Bangladeshi society.

Socioeconomic and demographic factors lead to varying health outcomes for patients because the higher the income or education the better health literacy he/she possesses and also the better health care he/she can seek, leading to improved healthcare utilization. These can be also termed moderators. Patient safety and patient experience outcomes are tied with income because patients with higher income can afford expensive treatments in elite hospitals. Many dimensions of social relationships, such as access to social networks and availability to emotional support, can be important to health through healthcare utilization, clinical processes of care, cost, and patient experience. Residential and community contexts indicate housing, walkability, broadband coverage, access to transportation, safety, and proximity to services. Patient experience will include communication with nurses and doctors, access to timely appointments and information, the responsiveness of healthcare staff, care coordination, pain management, medication information, and overall experience.

In terms of resource use outcomes, cost and quality of health depend on which part of the region the hospital is located in as well as how expensive the treatment is (patients with higher socioeconomic status can afford better or expensive treatment). For example, patients residing in the Gulshan area of Dhaka City, usually turn to United Hospital, which is expensive but has one of the highest rankings in terms of quality, whereas patients in the Old Dhaka area might turn to Capital General Hospital, which is cheaper but has one of the lowest rankings in terms of healthcare quality. Also, hospitals using telehealth services will likely see reduced admission rates and mortality in patients, and patients will also incur reduced healthcare-related costs (e.g., transportation costs). However, female rural populations might not have sufficient internet access, apart from social and cultural barriers, and might not utilize telehealth

services compared to other populations. Simultaneously, health care outcomes directly affect the resource use outcomes, mainly through high administrative costs, costly new technologies, expensive drugs, and physician fees. However, if the patient seeks telehealth, then the costs are likely to decrease as telehealth leads to improved patient outcomes through advanced monitoring, cognitive affordances, execution of life-saving, and evidence-based critical care protocols. Moreover, telehealth increases the ability to access timely care by reducing potential travel issues or transfers to other health care facilities. The government of Bangladesh has declared it will fix fees for healthcare services in private hospitals, and this will lead to reduced cost of care while improving the quality of health (Taufique et al., 2019).

3. Literature review

Telehealth usage during the COVID-19 pandemic has become one of the vital tools for patients to seek medical assistance. While there are a few studies regarding its utilization in Bangladesh, none of them have incorporated the gender aspect of the Bangladesh population. Although Bangladesh has made dramatic improvements in the health of girls and women since the last decade, gender inequalities in health and healthcare persist. A survey data of 900 participants (between 6.5 and 13.5 years old) included anthropometric results, where the prevalence of under-nutrition was high among females, with 35.3% stunting and 42.4% thinness (Rousham & Khandakar, 2016). As the study only included school-aged participants, it can expand by including older participants, preferably between 25 and 65 for a holistic analysis. Reasons such as socioeconomic and health literacy contribute towards health disparities in many countries including Bangladesh. Many females, especially those living in the country's rural regions, are unaware of common illnesses such as hypertension or diabetes. 74 female hypertensive participants were recruited for focus group discussion (FGD) in a rural community in the Mirzapur area during the pandemic, where they only knew about high blood pressure, but lack of social infrastructure, socio-cultural and economic barriers prevented them from seeking medical help even during the pandemic, where telemedicine facilities were available for their convenience (Jahan et al., 2020). Expanding the study to other areas, and not restricting it to a rural area will shed some light on the root cause for females not seeking formal medical healthcare. Not having own income and depending solely on spouse or family can also be a reason for not seeking healthcare, as females in some rural areas of Bangladesh face gender discrimination. Poor women were worse off relative to poor males in terms of antihypertensive medication use, where older age and higher BMI were associated with poor blood pressure control among them (p -value<0.05) (Rahman et al., 2017). The study included participants of 35–55 and above 56 years in both rural and urban regions, including Dhaka, Chattogram, Sylhet, Barisal, Khulna, Rajshahi, and Rangpur. These findings highlight the importance of sex-disaggregated analysis and reporting. More studies should be conducted to see if having a spouse or children translates to better health outcome for females or not and whether such a factor leads females to seek formal medical care.

The Diabetic Association of Bangladesh (BADAS) provided telehealth to children and adolescents with type 1 diabetes through phone calls and text messages, where 235 patients received advice over the phone from March to April 2020, and 52% of them were from the capital city, Dhaka (Zabeen et al., 2021). Most of the patients experienced hyperglycemia and were advised accordingly, and the study recognized telemedicine as a solution for routine care of diabetic children who are unable to travel long distances to clinics. However, the study did not include a gender perspective. Rural Bangladesh has good acceptability for telehealth, with a mean age of 32.38, a monthly income of approximately 9000BDT, and a maximum of 17 years of schooling (Iqbal, 2020). However, no study has been conducted involving both rural and urban parts of the country to assess telehealth efficacy in females vs males. Usability is one of the barriers to telehealth adoption; 61% of usability problems contributed to

slow adoption of mobile health usage (Jahan et al., 2020). But this paper only examines mobile applications and could be extended to other forms such as web applications and analyze which gender uses which application most.

Systematic reviews showed that telehealth interventions produce positive outcomes when they are used for remote patient monitoring, especially for chronic conditions (e.g. cardiovascular and respiratory disease) and psychotherapy (e.g. behavioral health), with improvement in mortality rate, quality of life, and reduced hospital admissions, reduced patient time in emergency departments, reduced heart attack mortality during emergency services and improved access and clinical outcomes for outpatient consultations (Rahman et al., 2017). Moreover, research in telehealth should be integrated with new payment and care models to assess the continuum of care in organizations. A paper studied four years of data from a nationally representative biannual consumer survey of telehealth use trends and the role policies play in its usage (Zabeen et al., 2021). As Bangladesh is a developing country, there are several challenges, including digital divides and gender disparities, and the equipment facilities in e-health services for both patients and healthcare providers should be increased, along with making separate laws and reimbursement policies for physicians and patients (Iqbal, 2020). Currently, the physician cost of telehealth and in-person visits is the same in most hospitals and clinics.

Furthermore, removing financial consumer barriers to using telehealth for low-income female populations can enhance telehealth visits. This can include implementing waivers or discounts to purchase needed equipment such as smartphones, data plans, or sufficient internet coverage. Misinformation and lack of communication networks made the healthcare system crumble, vulnerable and incompetent. In such chaos, national media outlets failed to efficiently and effectively deliver reliable information to the female audience from all walks of life, letting the more personalized and internet-based occupy the communication space (Jahan et al., 2020; Rahman et al., 2017). However, there is insufficient broadband coverage in most of the rural areas, posing further challenges to telehealth usage. It must be noted that even if telehealth service is widely available (i.e. during the COVID-19 pandemic), female rural patients might not have complete information on how, when, and where (through which platform) to use it. Therefore, improving education and awareness in underserved communities can increase overall health outcomes. The Ministry of Health in Bangladesh can mobilize investments to improve telehealth infrastructure and provide enough access to such populations and underserved communities.

4. Materials and methods

4.1. Study sample

We obtained de-identified cross-sectional data for outpatient telehealth visits from Global Health Data Exchange (Global Health Data Exchange, 2020) as it captures telehealth use throughout Bangladesh. It contains standard data elements such as demographics, diagnosis, age, income, gender, race/ethnicity, education, and more. Our sample is from age 16 to 45 and over, gender is only males and females, and the study period is 2020 only. This cross-sectional data, consisting of 200 Bangladeshi patients (14 female and 182 male and 4 participant observations were dropped as their gender information was missing) from both urban and rural areas of the country was part of the COVID-19 health services disruption survey 2020, which was developed to assess the level of disruption to a wide range of health services resulting from the pandemic and government mandates that lead to changes in behavior to mitigate the spread of the virus. 4 respondents were dropped as they did not reveal their gender. The open use public survey was conducted in 76 countries from 52,492 respondents, of which 200 respondents were from Bangladesh. The data was developed to assess the change in levels of service delivery before and immediately following the onset of the COVID-19 pandemic. Bill and Melinda Gates Foundation-funded it

(BMGF) and there were several contributors, including the Institute for Health Metrics and Evaluation (IHME), BMGF, Premise Data Corporation, Ipsos, and ORB International. There were a total of 36 questions in the survey, including the questions relating to health conditions, time spent with a healthcare provider, frequency of visits, medication, average income per month, and more.

4.2. Study outcomes

The primary outcome of interest was whether there was any gender disparity in utilizing telehealth services. Simple linear regression analysis was done in association with telehealth use and gender. We were able to capture and see if there was any causality between gender and telehealth use as well.

4.3. Covariates

We were able to examine the covariates such as age group and geography from the sample of 196 patients and do simple linear regressions to examine the causality of gender and telehealth visits.

4.4. Analysis

A statistical simple linear regression model is:

$Y_i = a + b_1X_{i1} + e_i$, were the estimated simple linear regression model is:

$e_i \sim N(0, \sigma^2) \quad i = 1$

“Fitted” Y_i : Y_i (An important tool)

OLS regression: $\text{Provider_num} = \beta_0 + \text{Gender_num} + e_i$, where $e_i =$ error term

Y_i would have been the Y values if the regression model were perfect.

$Y_i = a + b_1X_{i1} + b_2X_{i2} + \dots + b_kX_{ik} + e_i$ That is, if e_i were exactly zero.

The null and alternate hypotheses in this study are:

H0. Male and female telehealth users were equal ($=0$) vs.

H1. Male and female telehealth users were not equal ($\neq 0$)

After obtaining the data from Global Health Data Exchange, the file contained data from many countries and we extracted only the data for Bangladesh and excluded other countries, which had 200 de-identified Bangladeshi participants. 4 participants were dropped as their gender identity was missing, so we had a total of 196 participant observations. Initial cleaning was performed to identify missing variables. The dependent variable was the provider, where we wanted to see the impact on telehealth. The independent variable was gender (male or female). We labeled ‘0’ to male and ‘1’ to female. Participants in this study were more commonly male (92.86%) with the common age group of 16–25 years old (about 66%). Among the providers, we labeled online as ‘0’, which means the patients took virtual consultation with the physician from home and considered in-person consultation with a physician as a health facility and labeled it ‘0’. There were 4 age groups of 16–25 (65%), 26 to 35 (24%), 36 to 45 (7%) and 45 above (2%). One participant was under 16, which we dropped, considering it as an outlier. The analysis was done through STATA version 16.

5. Results and discussions

The analysis showed that 92.86% of participants were males in the study population, and had a higher dependency on telehealth than 7% of the females. However, dependency on in-person consultation (health facility) was also higher for males too. Among the 7% female population, 14% of them chose telehealth visits (online) over in-person physician consult and 57% of them had cases of missed medication doses. Among

the ~93% of the male participants, 20% chose telehealth visits (online) and 29% of them had cases of missed medication doses (Table 1).

To examine inferential statistics for determining if there is a significant difference between the means of telehealth visits and gender, a t-test was performed at a 95% confidence interval. The combined mean was 0.55 and the difference was -0.35. The combined standard error and standard deviation were 0.05 and 0.50, respectively. As we hypothesized that male and female users were not equal (2 sided test), we reject the null hypothesis that male and female users were equal (p-value = 0.02 < 0.05) at 95% C.I (Table 2). Hence, gender disparity existed in the telehealth usage in Bangladesh during the COVID-19 pandemic in 2020.

We performed a simple linear regression analysis with the use of telehealth use as the dependent variable, and gender as the independent variable. Gender was statistically highly significant, as the p value was 0.02 < 0.05. Hence, we reject the null hypothesis that male and female users were equal in telehealth usage during the COVID-19 pandemic in 2020. We also performed a simple linear regression to see if there was any causality between healthcare providers and gender and found causality as p-values < 0.05 at a 95% confidence level (Table 3). The p-value for gender was 0.021 < 0.05, and the constant was 0.00 < 0.05, which is highly significant.²

6. Limitations

Like any other survey design, this survey additionally suffers from potential “recall bias” requiring patients to remember past events regarding their doctor visits. Additionally, with a sample size of only 200, it is difficult to generalize our conclusion to over 163 million Bangladeshis, hence our study might lack generalizability. Where 64% of the population resides in rural areas and 49% of the country's population is female, the study only recruited 37% of the participants from rural areas and 7%, female. Hence, increasing the number of participants from rural areas and females can help balance out the issue with generalizability. Further research can be performed to see why female patients are reluctant in using telehealth services, what causes them to miss medication doses, and how those barriers can be overcome. Additionally, longitudinal data might have helped understand the gender disparities and impact in telehealth utilization. This study sheds light on the gender disparity in the adoption of telehealth in Bangladesh at a point where telehealth has been widely adopted globally due to the COVID-19 pandemic and future studies can help determine the root causes and barriers among females for not adopting telehealth and how it can be solved.

7. Conclusion

Among the four age groups, we found that the youngest age group, 16–25, had the highest dependence on telehealth than any other age group in Bangladesh. It can be because this age group is highly acquainted with technology and very aware of where to seek help when it comes to online platforms. The lowest dependence was among the oldest age group of 45 years and above (2%). This might be because this generation is least acquainted with technology and least aware of online platforms. Technical literacy is also a reason here because older generations have difficulty using mobile phones and computers. We wanted to see which gender used telehealth more often and found that males more commonly used telehealth platforms for medical assistance and had less frequent cases of missed medication doses. This highlights a gap in health awareness and health literacy among females and males in the country. However, it was interesting to note that men also had higher usage with in-person consultations too. This can be because our sample had ~93% males, which lead to a higher number of male telehealth users. We

² Number of obs = 83; F(1,81) = 5.54; Prob > F = 0.0210; R-squared = 0.0641; Adj R squared = 0.0525; Root MSE = 0.48677.

Table 1
Summary characteristics of patients in the sample.

Variables	Mean (SD)	Std. Err.	
Gender	.0714 (.258)	.018	
Geography	.3775 (.486)	.034	
Provider	.554 (.500)	.054	
Missed_dose	.5 (.502)	.043	
Gender	Frequency	Percentage	Cum.
Male (0)	182	92.86	92.86
Female (1)	14	7.14	100.00
Total	196	100.00	
Provider	Frequency	Percentage	Cum.
Online (0)	37	44.58	44.58
Health_facility (1)	46	55.42	100.00
Total	83	100.00	
Geography	Frequency	Percentage	Cum.
Urban (0)	122	62.24	62.24
Rural (1)	74	37.76	
Total	196	100.00	
Age	Frequency	Percentage	Cum.
16–25 years old	130	65.99	65.99
26–35 years old	48	24.37	90.36
36–45 years old	13	6.60	96.95
>45 years old	4	2.03	99.49
Total	196	100.00	

Note: The summary statistics provide information about the participant population, where std. err. = standard error and sd = standard deviation.

Table 2
Comparing telehealth visits with gender.

Group	Obs	Mean (S.E.)	Std. Dev.	95% C.I
Male (0)	70	0.50 (0.6)	.50	0.37–0.62
Female (1)	13	0.84 (0.1)	.37	0.61–1.07

Table 3
Regression analysis.

	Coef.	Std.Err.	P-value	95% C.I
Gender	0.34	.14	0.021	0.05–0.63
Provider	0.5	.05	0.000	0.38–0.61

wanted to see if there was any causality between telehealth use and gender disparity for the research question. There was a significant association between gender disparity and telehealth use and we rejected the null hypothesis. Overall, telehealth users have increased dramatically in Bangladesh due to the COVID-19 pandemic, but disparity exists among genders. One of the reasons can be the difference in education level and technical literacy in using online platforms for telehealth services. Although telehealth aims to provide patient care remotely and improve access to healthcare among rural patients, it is mainly used among urban populations due to technical literacy and awareness within urban patient populations. For telehealth to reach out to rural patients more successfully, the Bangladeshi government should increase funding and help startups lead the way. Furthermore, various socioeconomic factors influence the utilization of digital healthcare, for which government can enhance equitable access to health and healthcare for women through interventions targeting low and medium socioeconomic status. Various awareness programs relating to health education can contribute in this aspect (khanam & Hasan, 2020). Currently, venture capital investments are not allowed tax rebates, and only the 2% stamp duty is waived (LightCastle Partners, 2020). As rural patients are the most deprived population, investing in rural-based health startups can help improve their access. The higher income class has been the first adopters of telehealth and lower-income groups will be the last, but this disparity needs to be addressed.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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