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# IMPACT OF MOBILE INTERNET USE ON HEALTH-SEEKING BEHAVIORS: EVIDENCE FROM INDIA

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## ABSTRACT

Although health-seeking behaviors are crucial to India's healthcare delivery system, the influence of mobile Internet use in this context remains under-explored. This study aimed to comprehensively explore the influence of mobile Internet use on health-seeking behaviors, and meticulously examined the heterogeneity in health outcomes associated with the intersection between mobile Internet use and health-seeking behaviors.

**Keywords :** Crucial, Healthcare, Influence, Mobile Internet, Behaviors, Health-Seeking

## 1. Introduction

According to Billari et al., a new era in the digital revolution is emerging. Moreover, information and communication technologies (ICTs) are at the forefront of significant transformations in the distribution and accessibility of health and medical information. Fox and Duggan reported that many Internet users actively seek health information online. This transition facilitates individuals in acquiring knowledge regarding their health, addressing health challenges, making informed health decisions, and adopting behavioral changes, which has significantly narrowed the knowledge and power gap between healthcare professionals and the general populace.

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A nationwide survey by Wang et al. revealed that approximately 33.2% of Indian adults actively sought health information via the Internet. Following the outbreak of COVID-19, the "India Internet Development Report 2022" revealed that, as of December 2022, the number of users participating in health-related Internet activities in India had increased to 363 million, accounting for 34% of the total Indian Internet users. Owing to their importance, these developments have garnered increasing attention from policy-makers and researchers in developing countries. ICTs have significantly amplified the dissemination of medical information, leading to profound changes in the volume, quality, and scope of accessible information. This, in turn, has had a consequential impact on individuals' health-seeking behaviors.(1) Within the medical marketplace, "information represents a valuable commodity"; consequently, transformations in the dynamics of information supply and demand are set to have a compelling "inducing effect" on the health-seeking behaviors of individuals. A strand of current research has been dedicated to exploring the nexus between ICTs and health-seeking behaviors. However, elucidation of the precise nature of this relationship is ongoing. The research conducted by Lee et al. which employs data derived from New York City, suggests

that Internet use can markedly influence the health-related attitudes and behaviors of a significant proportion of the population, as well as the management of chronic diseases. Nevertheless, some scholars, such as Takahashi et al. and Zwijnenberg have posited that patients' interest in online comparative healthcare information seldom translates into tangible changes in their health-related behaviors.(2)

## 2. Review of Literature

The foundational behavioral model of healthcare utilization, developed by Andersen. delineates health-seeking behaviors as a pivotal behavioral element that fundamentally supports the utilization of healthcare services. An effective strategy for understanding health service utilization concerns examining health-seeking behaviors, which involves two steps: First, when residents are sick, they decide whether to seek healthcare or not, including the option of self-medication. If they choose to seek healthcare, the second step is deciding between visiting primary care facilities (PCFs) or higher-level hospitals.

The inefficient utilization of healthcare resources presents a perennial challenge to global healthcare systems and is particularly pronounced in India, underscoring the urgency to

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understand individuals' health-seeking behaviors. In India, the healthcare delivery system is predominantly hospital-centric and fragmented. Given that patients often harbor doubts regarding the quality of care provided by PCFs, it is common for them to sidestep local PCFs and directly seek services from higher-level hospitals, even for minor and common ailments. Consequently, understanding and analyzing health-seeking behaviors among Indian residents is a priority, and the determinants of these behaviors have attracted considerable attention from the scholarly community. (3)

The wide-spread availability of mobile Internet globally has played a crucial role in enhancing accessibility to medical information, bolstering social support networks, and forging new pathways for interactions between patients and healthcare professionals. Furthermore, compared with the offline world, mobile Internet presents numerous patient benefits, including enhanced convenience, increased time efficiency, and reduced space- and time-related constraints. Therefore, we posit that mobile Internet use may significantly influence health-seeking behaviors. The advent of mobile Internet has empowered individuals to acquire healthcare knowledge through diverse platforms, including online medical lectures and healthcare-focused mobile applications. These digital platforms provide exhaustive diagnostic and therapeutic information on a wide spectrum of prevalent diseases by incorporating essential definitions and symptoms, strategies for medication administration, and detailed contraindications. If a patient determines that the ailment is common and that their health status is stable, they are likely to procure medications and engage in self-diagnosis in accordance with the online treatment protocol. Conversely, if the assessment is incorrect, the individual will likely opt for a consultation with a physician. However, theoretically, access to a more extensive array of information should ostensibly culminate in more informed decision-making. Nevertheless, the advantages of increasing information within the healthcare sector are multi-faceted and complex. Given the diverse array of sources of mobile Internet information, this multiplicity could intensify the fragmentation of individual disease knowledge, potentially heightening individuals' dependence on authoritative medical institutions for accurate information.

## 3. **Materials and methods**

The foundational statistical data in our analysis originated from the 2020 cycle of the India Family Panel Studies.(4) This comprehensive biennial longitudinal survey offers a nationally representative snapshot of Indian households. This dataset is optimally suited to our research objectives, offering a comprehensive collection of data related to mobile Internet use, in addition

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to detailed records encompassing health-seeking behaviors, health status, and demographic characteristics. The dataset encompasses a sample of approximately 14,960 households spanning provinces, cities, and autonomous regions, representing approximately 94.5% of the country's population. Owing to the availability of daily Internet usage data exclusively in the most recent survey, our analysis was confined to data from 2020.

The 2020 India Family Panel Studies database comprised three distinct sections: family, adult, and children databases. In response to the specific requirements of our study, we analyzed the data from the adult and family databases. Initially, we aligned and integrated data from the adult and family databases and subsequently eliminated redundant samples. Thereafter, the data was refined by excluding entries that lacked essential variable information. Ultimately, after data selection and cleansing, 22,496 observations were selected. The sample size used for the regression analyses was subject to variation, contingent on the specific model specifications and data availability for pertinent variables.

It has been defined as any action undertaken by individuals who perceive themselves to have a health problem or to be ill for the purpose of finding an appropriate remedy (38). Based on the behavioral model of healthcare utilization, health-seeking behaviors encompass the pursuit of self-medication during illness and the selection of health facilities. The primary measure of health-seeking behavior is self-medication use, which is defined as the practice of individuals treating their ailments and conditions with medications or remedies without professional supervision. In the present study, the corresponding question was as follows: "Have you consulted a physician regarding any illnesses experienced within the previous 2 weeks?" A dichotomous outcome variable was used, taking a value of "1" if the individual consulted a physician and "0" if the individual did not consult a physician but there was a purchase of medication with an expenditure greater than 0. Additionally, based on studies by Minhas and Zhou et al. the answer to the question "To which kind of facilities do you usually go to seek health services when you are sick?" was used as the type of health care facilities that residents usually approach when seeking health services. This aspect effectively mirrors residents' choice of different levels of healthcare institutions during instances of illness, an occurrence commonly denoted as health-seeking behavior.

The behaviors and their preferences for healthcare providers Detailed definitions and explanations of these categories are presented in Table 1.

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| Variables<br>Dependent variables | Definition | Mean | Full<br>SD | Users<br>Mean | Non-<br>Mean | Diff. |
|---|---|---|---|---|---|---|
| Health Problems | Yes =1, | 0.637 | 0.481 | 0..1 | 0.264 | 0.177 |
| Behavior Patterns | Yes =1, | 0.57 | 0.495 | 0.53 | 0.645 | 0.115 |
| Academic Performance | | | | | | |
| Internet | Yes =1,<br>No=0 | 0.655 | 0.475 | | | |
| Smart Phones | Hours | 1.967 | 2.681 | | | |
| Control variables | | | | | | |
| Gender | Years | 45.2 | 16.38 | 38.287 | 58.322 | 20.035 |
| Male and Female | Years | 2311.4 | 15..7 | 1650.1 | 3566.6 | 1916.48 |

### 3.1 Empirical strategies

To explore the impact of mobile Internet use on health-seeking behaviors, we used logistic regression (logit) analysis to estimate the following model:

$$\log(Y_{1i}) = \alpha_0 + \alpha_1 Internet_i + \alpha_2 X_i + \varepsilon_i \quad (1)$$

$$\log(Y_{2i}) = \alpha_0 + \alpha_1 Internet_i + \alpha_2 X_i + \varepsilon_i \quad (2)$$

In Equations and , the subscript $_i$ represents the $i-th$ individual respondent. The dependent variable $Y_1$ is the self-medication choice of

In Equations (1) and (2), the subscript i represents the $i-th$ individual respondent. The dependent variable $Y_1$ is the self-medication choice of respondent $i$, and $Y_2$ is the choice of medical facilities. The key independent variable is the status of mobile Internet use. Additionally, a comprehensive vector of control variables $X_i$ was included in the model, and the error term $\varepsilon_i$ was used to account for unobserved heterogeneity.

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Using a logit model to estimate the effect of mobile Internet use on health-seeking behaviors is associated with challenges, such as endogeneity and omission of relevant variables. For instance, mobile Internet users are often characterized by higher levels of education and income, which may correlate with a more advanced understanding of health information and greater financial ability. Such factors can enhance self-medication tendencies and inclinations to opt for healthcare services from higher-tier hospitals, potentially leading to biased estimates. To attain reasonable and consistent regression outcomes regarding the impact of Internet development on health, we used the instrumental variable (IV) method. Building on the findings of prior research.

The proportion of plain areas and average Internet usage rated as IVs were used to examine mobile Internet usage. Regions characterized by a higher prevalence of plains exhibit relatively fewer challenges in Internet infrastructure development, thereby enhancing mobile Internet accessibility in these locales. Conversely, in regions with scanty plain areas, the more complex terrain poses unfavorable geographical conditions for constructing diverse Internet infrastructure. (5)

Owing to data availability, we selected data from various Indian provinces as IVs. Specifically, we used the proportion of plain areas within these provinces (denoted as "Land") as the IV to gauge mobile Internet usage. However, an elevated average mobile Internet usage rate in urban areas could potentially amplify individual access to mobile Internet, which is attributable to shared local Internet infrastructure and cultural influences. Consequently, the mean mobile Internet usage rate among other respondents within the same city, excluding the respondent in question, was used as a secondary IV. These two IVs demonstrate a significant correlation with mobile Internet use; however, they are not presumed to directly affect an individual's healthcare-seeking behaviors, except through mobile Internet. To ensure the robustness of our analysis, we used a range of methodologies, including IV-probit, extended regression models, and propensity score matching, to thoroughly ascertain and validate the reliability of our findings.

**4. Results**

Descriptive statistics Table 1 presents the definitions and a comprehensive summary of the statistical analyses conducted for both dependent and independent variables. The sample data showed that the mean age of the respondents was approximately 45 years, indicating that mobile Internet users were markedly younger than non-users. Furthermore, most mobile Internet users were educated, residents of urban areas, and had higher family incomes. Regarding health-

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seeking behaviors, a greater proportion of mobile Internet users opted for self- medication than did non-users when ill (0.441 versus 0.264, $p < 0.01$). Notably, approximately 53% of mobile Internet users chose PCFs for health services, compared with 64.5% of non-users.

**Methods:**

We used nationally representative data derived from the India Family Panel Studies. Given that individuals typically make the decision to use mobile Internet autonomously, an instrumental variable regression methodology was adopted to mitigate potential selection biases. Results: Our findings revealed that mobile Internet use significantly promoted self-medication and adversely affected the use of primary care facilities among Indian adults. Furthermore, our findings highlighted the heterogeneous effects of mobile Internet use across diverse health demographic groups.

**Conclusion**

These findings underscore the importance of strategic planning and utilizing mobile Internet resources to steer individuals toward more appropriate healthcare-seeking behaviors.

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