The struggle for digital inclusion: Phones, healthcare, and marginalisation in rural India

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ABSTRACT

The gains from digital technology diffusion are deemed essential for international development, but they are also distributed unevenly. Does the uneven distribution mean that not everyone benefits from new technologies to the same extent, or do some people experience an absolute disadvantage during this process? I explore this question through the case study of curative healthcare access in the context of rapid mobile phone uptake in rural India, contributing thus to an important yet surprisingly under-researched aspect of the social implications of (mobile) technology diffusion.

Inspired by a previous analysis of cross-sectional data from rural India, I hypothesise that health systems increasingly adapt to mobile phone users where phones have diffused widely. This adaptation will leave poor non-adopters worse off than before and increases healthcare inequities. I use a panel of 12,003 rural households with an illness in 2005 and 2012 from the Indian Human Development Survey to test this hypothesis. Based on village-cluster robust fixed-effects linear probability models, I find that (a) mobile phone diffusion is significantly and negatively linked to various forms of rural healthcare access, suggesting that health systems increasingly adapt to phone use and discriminate against non-users; that (b) poor rural households without mobile phones experience more adverse effects compared to more affluent households, which indicates a struggle and competition for healthcare access among marginalised groups; and that (c) no effects emerge for access to public doctors, which implies that some healthcare providers are less responsive to mobile phone use than others.

Overall, my findings indicate that the rural Indian healthcare system gradually adapts to increasing mobile phone use at the expense of non-users. I conclude that rapid mobile phone diffusion creates an opportunity to improve people's access to healthcare in rural India, but it also creates new forms of marginalisation among poor rural households.

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1. Introduction

It is a common stance that the diffusion of information and communication technology (ICT) is essential for development (Aker & Mbiti, 2010:229; Donner, 2015:14; Heeks, 2008:26), but what if the process of digital inclusion is a struggle that leaves excluded groups *worse off* than before? I investigate this question through the case study of phone-aided curative healthcare access in rural India between 2005 and 2012, demonstrating that the increased availability of mobile phones intensifies competition for scarce healthcare services among poor rural households. While poor phone owners enjoy more access to private doctors in contexts of rapid mobile phone diffusion, the slow-growing supply of healthcare and a system that caters increasingly to phone users mean that poor households without mobile phones see their access to healthcare diminish. Left to their own devices, mobile phone adopters thus outcompete non-adopters in the struggle for scarce

rural healthcare services.[1] All the while, more affluent households with a broader range of options to access healthcare are insulated from these developments.

This research was motivated by the literature on "digital divides" and "information and communication technologies and development" (ICTD), which has begun to examine the inequalities of technology adoption (Donner, 2015:137–154; Graham, Hogan, Straumann, & Medhat, 2014:758–759; Napoli & Obar, 2014; Schroeder, 2015:2828–2830; van Dijk, 2005:22), but which tends to assume that diffusion itself is desirable and that nobody experiences an absolute disadvantage through it. Contrary to this position, an earlier mixed-methods research project on healthcare-related mobile phone use in rural India and rural China suggested that widespread mobile phone use can lead to an adverse over-utilisation of resource-constrained rural healthcare systems, which can leave digitally excluded groups at a growing disadvantage (Haenssgen & Ariana, 2017b). Because the cross-sectional study was not designed to capture long-term and systemic effects of mobile phone diffusion, the present paper uses India-wide panel data from the Indian Human Development Survey (IHDS; Desai et al., 2010b; Desai, Vanneman, & National Council of Applied Economic Research., 2016). Adopting a process perspective of mobile-phone-aided healthcare access, I hypothesise that the increasing spread of mobile phones in rural India worsens healthcare access for digitally excluded households.

This paper contributes to the interdisciplinary study of the social implications of technology diffusion in general, and to the study of digital divides and inclusive innovation in the field of ICTD in particular. It advances the conceptualisation of digital inclusion through an empirically grounded process framework of technology adoption that appreciates dynamic and systemic effects of mobile phone diffusion on healthcare access in rural, resource-constrained areas. Empirically, it provides the first quantitative evidence that the healthcare access of digitally excluded groups deteriorates with increasing mobile phone diffusion, which challenges the framing of mobile phones as an inclusive innovation and of digital inclusion as an unproblematic process. The tools and findings of this paper offer space for further research in other areas of digital development, like employment, government service access, or social interaction.

The remainder of this paper situates the study in the fields of technology adoption and ICTD, followed by a detailed description of the analytical framework (Section 2). Section 3 explains the empirical model to analyse the household panel data from the IHDS, using fixed-effects linear probability models with village-cluster robust standard errors to estimate households' probability to access healthcare as a function of mobile phone adoption and district-level phone diffusion. The results are described in Section 4, showing that households who failed to acquire a mobile phone between 2005 and 2012 are on average poorer, and that poor households without mobile phones are less likely to gain access to "responsive" private healthcare providers if mobile phones have otherwise diffused widely in their district. Section 5 will argue that the results correspond to the analytical framework. On the demand side, diffusion drives competition and creates divides between poor phone users and non-users. On the supply side, healthcare providers who are more responsive to patients' mobile phone use will increasingly cater to this group at the expense of non-users. That public healthcare access is yet unaffected by these trends should only offer momentary respite, given that my previous cross-sectional study in 2013–2014 indicated that public providers in rural India have begun to adapt to patients' mobile phone use,

too. Section 6 concludes.

2. Literature and framework

2.1. Technology Diffusion, ICTD, and digital divides in the context of mobile phones

This paper speaks to the literature on digital divides and "information and communication technologies and development" (ICTD) as part of the broader, interdisciplinary study of the social implications of technology diffusion. Two key insights from the broader field—comprising anthropological, sociological, and economic research—are that (a) technology diffusion has both positive and negative consequences for social, economic, and political development; and that (b) these implications are not evenly distributed (Miller, 2010:53; Pedersen & Bunkenborg, 2012:565; Munn, 1992:109; Thompson, 1967:81–86; Bédoucha, 2002:104). Given the commonly understood dialectic relationship between technology and society, it seems indeed improbable that technology diffusion invariably leads to desired development outcomes like improved economic security, education, or political participation (consider e.g. the human development index by the United Nations Development Programme, consisting of income, education, and longevity; UNDP, 2014:160–163). That not all technical change processes are "pro-poor" has been shown for instance by Gudeman (1992:145), who illustrates how continuing innovation and technical change helps Guatemalan households to generate savings and—potentially—profits in the local markets, but their lacking bargaining power means that more competitive merchants absorb the surplus. And although the broader economic literature of technology diffusion tends to be more enthusiastic about its potential benefits (Bandiera & Rasul, 2006:869; Besley & Case, 1993:396; Foster & Rosenzweig, 2010:421), it, too, is occasionally cognizant of nuances and absences of development outcomes (Stewart, 1978:74).

Within this field, ICTD research focuses on a subset of (typically digital) technologies and their potential applications to support "development" (variously defined) in low- and middle-income contexts (Duncombe, 2012:2; Díaz Andrade & Urquhart, 2012:289; Flor, 2015; Heeks, 2014:2; Unwin, 2009:1). As a result, most research in the area of ICTD has focused on ICT readiness and availability, the factors that drive diffusion and acceptance of technologies, and the positive development potential of technological change (Andersson & Hatakka, 2013:293; Dodson, Sterling, & Bennett, 2012; Heeks, 2014:12; Qureshi, 2015:516; Roztocki & Weistroffer, 2014:351). This involves for example the development and delivery of phone-based interventions in areas like personal finance (Jack & Suri, 2014:220), agricultural marketing (Rashid & Elder, 2009:5–8), or learning (Aker, Ksoll, & Lybbert, 2012:118).

The techno-centric focus in ICTD has been criticised for its insufficient emphasis on the social embeddedness of technology, user behaviour and different forms of use, unintended negative and positive effects of ICT diffusion, the equity implications of technological change, and the broad spectrum of consequences surrounding digital inclusion and exclusion (Ayanso, Cho, & Lertwachara, 2013:63; Graham, 2011; Heeks, 2014:12; Sæbø & Furuholt, 2013:128–130; Wyche, 2015:2). The field is only now experiencing a gradual transition towards broader research of technological and social development, a growing theoretical base, and more interdisciplinary and mixed-method research that permits locally grounded conclusions—beginning thus to reflect concerns of the broader study of technology diffusion (Andersson & Hatakka, 2013; Burrell & Toyama, 2009; Chib, 2015; Donner, 2015; Gagliardone, 2015; Heeks, 2009:27; Kleine, 2013; Walsham, 2013:50).

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[1] The term "adopter" here implies that a mobile phone is being used for a health-related purpose. Theoretically, owning or using a phone in general might not necessarily entail health-related uses.