3G Internet, Intimate Partner Violence, and Women's Empowerment: Evidence from Nigeria

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Abstract

A growing body of research has highlighted the impacts of mobile phones on women's status in low- and middle-income countries (LMICs), through improved labour market opportunities, contraceptive knowledge and access, and decision-making power within the household. However, this literature relies on cross-sectional designs and does not distinguish between type of mobile technology (2G v 3G). This distinction is important because the spread of the internet can have theoretically ambiguous and complex effects, which can enable exposure to information and globalized liberal ideas, but also reinforce gender stereotypes, trigger backlash effects, and spread misinformation. We examine how the rollout of 3G mobile networks over time in Africa's most populous country, Nigeria, affects women's status within the household looking at the experience of intimate partner violence and women's decision-making power. We draw on two waves of the Demographic and Health Survey data, which we link with mobile coverage maps, and estimate the impact of 3G using cluster-matched difference-in-difference models. We find the 3G network expansion results in reductions in emotional and physical IPV, as well as improved women's autonomy within the household. Our findings emphasize how technological changes can spread new ideas and norms, which in turn influence gender dynamics within households.

Introduction

The widespread diffusion of mobile phones has been the defining technological transformation of the new millennium. Since the mid-2000s, the spread of 3G+ networks have accelerated the spread of the internet through mobile phones, especially for the African continent, where fixed internet infrastructure remains

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limited. Beyond the communication capabilities offered by 2G-enabled mobile technology, the spread of mobile internet via 3G has the potential to improve access to information and services, and enable exposure to globalized media content and cultural scripts. These impacts of technologies may be especially salient for marginalised populations, such as women, who face disadvantaged access to economic resources and social networks through traditional channels. A growing body of empirical research has explored these ideas and highlighted the positive impact of mobile phones on women's status through improved labour market outcomes (Suri and Jack, 2016), decision-making power within the household (Rotondi et al., 2020; Pesando, 2022), contraceptive knowledge and access (Rotondi et al., 2020), and reductions in experiences of intimate partner violence (Pesando, 2022). However, this literature does not distinguish between type of technology enabled by mobile phone (2G v 3G), even though these technologies may plausibly result in differential impacts, given the distinct functionalities they offer (simple calling and messaging versus internet capabilities). Further, the existing work largely draws on cross-sectional designs where mobile ownership is measured at the individual-level at one point in time.

This paper re-visits the question of mobile technology and women's empowerment by investigating the impacts of 3G expansion on women's experience of intimate partner violence, a key marker of women's status, and decision-making power within the household in the context of Africa's most populous country, Nigeria. In contrast to previous work, we study the *rollout* of mobile internet via 3G networks by linking the Demographic and Health Surveys with geospatial data on mobile coverage maps within a matched difference-in-difference design to estimate the causal impacts of mobile internet rollout.

Background

Diffusion theories of fertility transitions have long acknowledged the role that mass media can play in the spread of new ideas and norms, and in turn influence gender and demographic outcomes (Barber and Axinn, 2004). Consistent these ideas, studies have shown how TV and radio have impacted on fertility ideals, son preference, and women's status within the household (Jensen and Oster, 2009; Ferrara, Chong and Duryea, 2012). The spread of information of communication technologies, including mobile phones and the internet, have re-invigorated interest in the impacts of technological change on gender and demographic dynamics. Burgeoning research has shown how the spread of mobile phones has impacted on improved access to labour market opportunities (Suri and Jack, 2016; Chiplunkar and Goldberg, 2022), access to contraception and antenatal care (Rotondi et al., 2020), and women's empowerment, as measured through reductions in IPV (Pesando, 2022) and decision-making within the household (Rotondi et al., 2020).

While this literature points to associations between mobile phones and women's status, the technological

measure of interest is the ownership of mobile phones, without distinguishing between 3G v 2G technologies. The maturation of digital technologies, and in particular, the spread of internet technologies may plausibly generate more complex, theoretically ambiguous effects, especially in relation to household dynamics and women's status. In contrast to 2G technologies, Internet technologies via 3G enable improved access to information, especially that can be accessed privately, as well as access to broader social networks, e.g. through social media, where information sharing is interactive and amplified. The internet enables globalized media exposure and presumably global, liberalized cultural scripts (Pesando, 2022; Varriale et al., 2022), but in turn may also amplify messages of dis- and misinformation, reinforce gender stereotypes for men and women, trigger backlash effects, as well as provide a new outlet to perpetuate gender-based violence against women (Dunn, 2020; Faith, 2022; Lisnek et al., 2022). In light of these, we hypothesize that the net effect of 3G expansion on women's experience of intimate partner violence and their autonomy within the household women could either be negative or positive.

Methods and Data

We rely on two waves of geo-referenced Demographic and Health Survey (DHS) data from Nigeria for the period 2008 and 2018 for our analysis. We supplement the data from DHS with information on 3G mobile coverage expansion from Collins Bartholomew-GSMA mobile coverage maps. We use the maps to compute a population-level measure for the 3G and 2G network coverage at the level of the DHS cluster at two time points aligned with the dates of the DHS.

To examine the causal impact of 3G internet on intimate partner violence and women's empowerment, we exploit plausibly exogenous variation generated by the 3G coverage expansion in Nigeria over the period 2008-2018. Our quasi-experimental setup relies on matching methods and a difference in difference design, where we match DHS clusters that are geographically as close as possible across waves. DHS clusters change across waves which does not allow us to put cluster fixed effects. Hence, our design matches clusters that are as geographically proximate, or pseudo-clusters, so that we can assess differences between pseudo-clusters that gain 3G versus those that do not. We estimate how expansion in 3G coverage over time affects intimate partner violence faced by women, and asess the impacts on women's decision-making power in the household as the inter-mediating mechanism. To ensure that our results are on account of access to fast 3G internet, we control for the share of population covered by 2G network in an area, in all our regressions (Chiplunkar and Goldberg, 2022). We also include controls for age, education, gender of the household head, age of the household head, number of members and children in the household, age of the partner, education of the partner, years of cohabitation, drinking status of the partner, wealth status of the household, place of

residence (rural vs urban), along with time and geographic (pseudo-cluster) fixed effects in our regressions. Our estimation equation for individual i residing in pseudo-cluster c at time t is given below:

$$Y_{i,c,t} = \alpha_c + \beta_t + \theta \cdot 3G_{c,t} + \gamma \cdot X_{i,c,t} + \epsilon_{i,c,t} \tag{1}$$

where, α_c and β_t represent pseudo-cluster and time fixed effects, respectively. $3G$ is a continuous measure which captures the proportion of population of a given cluster that is covered by 3G network at given time t. θ captures the effect of 3G on our outcomes of interest Y. X accounts for time varying controls at the individual, household, and cluster level. We cluster our standard errors at the geographic pseudo-cluster level.

Preliminary Results

Table 1 reports the results for the effect of 3G internet on intimate partner violence faced by women in Nigeria. We find that women exposed to 3G expansion were likely to face lower levels of intimate partner violence. Specifically, we find that emotional violence and physical violence experienced by women reduced significantly on account of 3G network expansion in the country.

Table 1: DID estimates for the impact of 3G on Intimate Partner Violence in Nigeria

	Emotional Violence (1)	Sexual Violence (2)	Physical Violence (3)
3G Effect	-0.053**	-0.011	-0.042*
	(0.027)	(0.014)	(0.022)
R^2	0.16	0.10	0.19
Observations	22,760	22,738	22,692

Notes: All columns represent different regressions for currently partnered women from the DHS 2008 and 2018 dataset for Nigeria. Robust standard errors clustered at the pseudo-cluster level are reported in parentheses. *** p<0.01 **p<0.05 *p<0.1

Potential Channel

The 3G network, in contrast to 2G, allows for improved internet accessibility to users. Using 3G, users can freely browse the internet and they can view, download, as well as transfer content including videos and images easily. While 2G network focuses on calling and text messaging capabilities, 3G services have given a new meaning to always staying connected. These features of 3G internet, can work to reduce intimate

partner violence in different ways. For instance, exposure to informational, and educational content on the internet in the form of videos, blogs, or social media can help empower women by assisting them in decision making and enabling them to become self-reliant. We test this conjecture in Table 2 to see if 3G network expansion affected women's autonomy. The results suggest that women exposed to 3G were more likely to be the sole decision makers in matters related to their own health. Furthermore, exposed women were also more likely to be the decision makers in matters related to large purchases for the household. This shows the empowering effect of 3G that can help improve women's autonomy in the household.

Table 2: DID estimates for the impact of 3G on autonomy of women in Nigeria

	Decision maker for:				
	own healthcare (1)	large hh purchases (2)	visit to family/relatives (3)	husband earnings (4)	Autonomy Index (5)
3G Effect	0.032**	0.025**	0.009	0.009	0.078*
	(0.015)	(0.010)	(0.021)	(0.013)	(0.041)
R^2	0.14	0.11	0.14	0.08	0.16
Observations	40,817	40,872	40,810	40,313	40,266

Notes: All columns represent different regressions for currently partnered women from the DHS 2008 and 2018 dataset for Nigeria. Robust standard errors clustered at the pseudo-cluster level are reported in parentheses. *** p<0.01 **p<0.05 *p<0.1

We further assess the impact of 3G on controlling behavior of the husband in Table 3. We find that expansion of 3G network coverage resulted in significantly lower likelihood of husband/partner insisting on knowing of location of the woman. While 3G coverage didn't have a significant effect on any other 'control' measure, it's effect on husband's insistence to know the location, directly ties into the connectivity benefits of the 3G technology.

Next Steps

We will supplement this analysis with additional coverage maps, and a broader set of outcomes (including those on men's attitudes and behaviours). We will further assess to what extent the effects of technology rollout are mediated through individual device ownership.

Table 3: DID estimates for the impact of 3G on husband's/ partner's controlling behavior in Nigeria

	Husband/ Partner:				
	jealous if talks with other men	accuses of unfaithfulness	doesn't permit to meet female friends	limits wife's contact with family	insists on knowing location
	(1)	(2)	(3)	(4)	(5)
3G Effect	-0.039	0.004	0.009	-0.009	-0.132***
	(0.033)	(0.020)	(0.024)	(0.017)	(0.031)
R^2	0.15	0.12	0.10	0.09	0.15
Observations	22,539	22,642	22,647	22,619	22,610

Notes: All columns represent different regressions for currently partnered women from the DHS 2008 and 2018 dataset for Nigeria. Robust standard errors clustered at the pseudo-cluster level are reported in parentheses. *** p<0.01 **p<0.05 *p<0.1

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