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EXAMINING THE GENDER DIGITAL DIVIDE

A Case Study from Rural Kenya

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Worldwide, cell phones are used by 5.4 billion people. They are becoming increasingly prevalent in the rural areas of low- and middle-income countries (LMICs), providing smallholder farmers with access to agricultural markets. If they reduce information asymmetries between women and men farmers, they can also contribute to closing the gender gap in agricultural productivity. So far, however, digital innovations have had limited success in transforming agricultural systems. This may be due, in part, to the gender gap in cell-phone use. Rural women in LMICs—particularly those with low incomes, low literacy levels, or disabilities—are less likely than rural men to have access to cell phones, the Internet, digital currency, or other digital services. This policy note summarizes research intended to shed light on the impact of cell-phone ownership and use on the gender gap in agricultural productivity in LMICs.

DATA AND METHODOLOGY

The analysis reported in this policy note is based on interviews with 1,050 rural households in 70 villages of Kenya's Kitui County during November and December 2022. The purpose of the study was to explore the impact of access to and use of digital services on agricultural productivity, and whether and to what extent a gender divide existed. In order to assess the impact of variable network coverage, the household sample was divided equally between areas with high and low network coverage. Note that household plots were categorized as (1) those managed by *women only* (a subsample of 340); (2) those managed by *men only* (a subsample of 296); and (3) those with at least one man and one woman listed as managers (a subsample of 634).

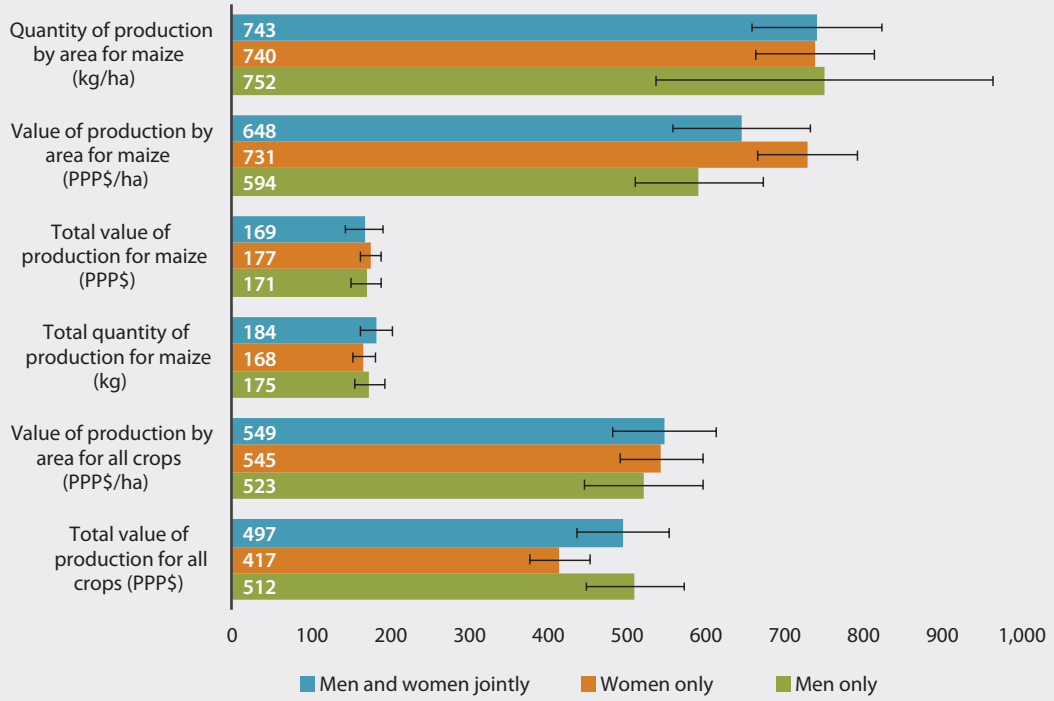
Gender Differences in Agricultural Productivity

In examining gender differences in agricultural productivity, the study looked both at maize only, which is Kenya's main staple crop, and at all crops combined. None of the differences across categories was statistically significant. In other words, in comparing all three categories of plot management one-to-one, no significant differences were found in agricultural production (Figure 1; see also, the box on data and methodology). Plots managed by *men only* performed better than those managed by *women only* for maize yields (kilograms per hectare [kg/ha]), total quantity of maize produced (kilograms [kg]), and value per hectare for all crops in purchasing power parity (PPP) dollars (PPP$/ha). Plots managed by *women only* performed better than plots managed by *men only* in terms of value per hectare for maize (PPP$/ha), total value for maize (PPP$), and value per hectare for all crops (PPP$/ha). (Note that PPP indicates purchasing power parity conversion factors, which take the purchasing power of the local currency into account in reference to the U.S. dollar.)

Gender Differences in Cell-Phone Ownership and Use

No significant gender differences were found in the likelihood of farmers' owning basic cell phones, but men were nearly twice as likely as women to own smartphones (Figure 2). Consequently, although smartphone ownership remains uncommon in Kitui County overall, men were significantly more likely to own any kind of cell phone than were women.

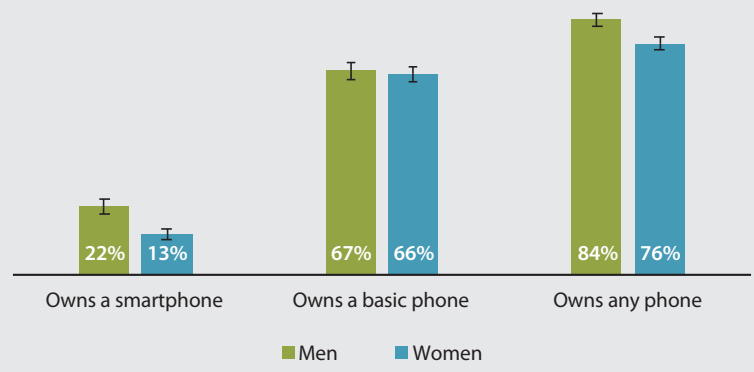
FIGURE 1. Crop production by gender of plot decisionmaker



Source: Calculated by authors based on primary survey data.

Notes: The sample included 634 plots managed by men and women jointly, 340 plots managed by women only, and 296 plots managed by men only. No differences across groups were significant. Confidence intervals are shown at the 90 percent level.

FIGURE 2. Cell-phone ownership by gender and type of device



Source: Calculated by authors based on primary survey data. .

Notes: The sample included 819 men and 889 women who managed at least one cultivated plot of land. The differences between men and women for "Owns a smartphone" and "Owns any phone" were found to be significant ($p < 0.1$). Confidence intervals are shown at the 90 percent level.

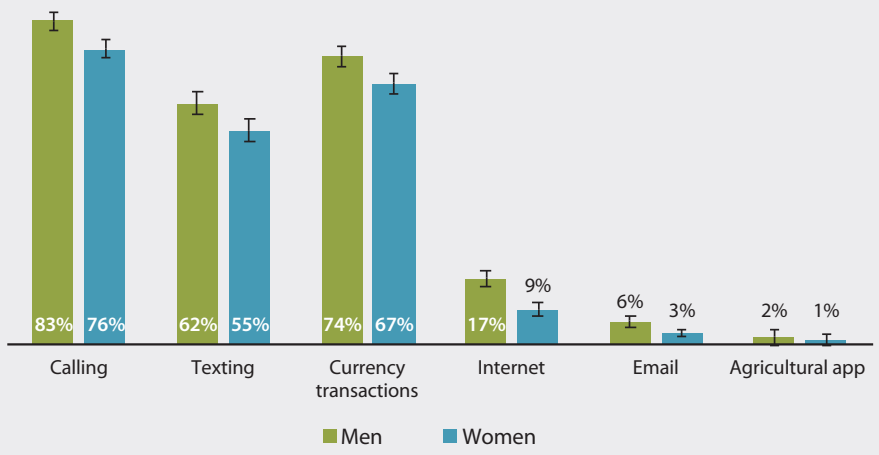
Smartphones are unique in that, unlike most basic cell phones, they provide access to the Internet. It is also important to note that the way respondents were asked about cell-phone ownership and use in the survey limited the scope of the findings. In order to explore cell-phone sharing among household members, the survey allowed each phone to have multiple users, but the types of features accessed—such as email, text messaging, and so on—were not disaggregated by user. As a result, it was not possible to link individual owners/users with the different features used. Instead, data only indicate how frequently phones that were reported as being owned by women and men were used to access different features/applications (Figure 3).

Although the survey indicated that the use of agriculture-relevant digital applications was very low for both men and women (2 percent and 1 percent, respectively), men were significantly more likely than women to own cell phones capable of accessing Internet-based features, including email, Internet calling and messaging, and social media. These differences can be fully attributed to smartphones; after controlling for ownership, all gender differences in usage become insignificant. Thus, while there were stark gender differences in the ownership of smartphones, there were no differences in how women and men used smartphones. Nonetheless, the gender gap in smartphone ownership has important implications as a driver of gender inequality in Internet access.

The Impact of Cell-Phone Ownership on Agricultural Productivity

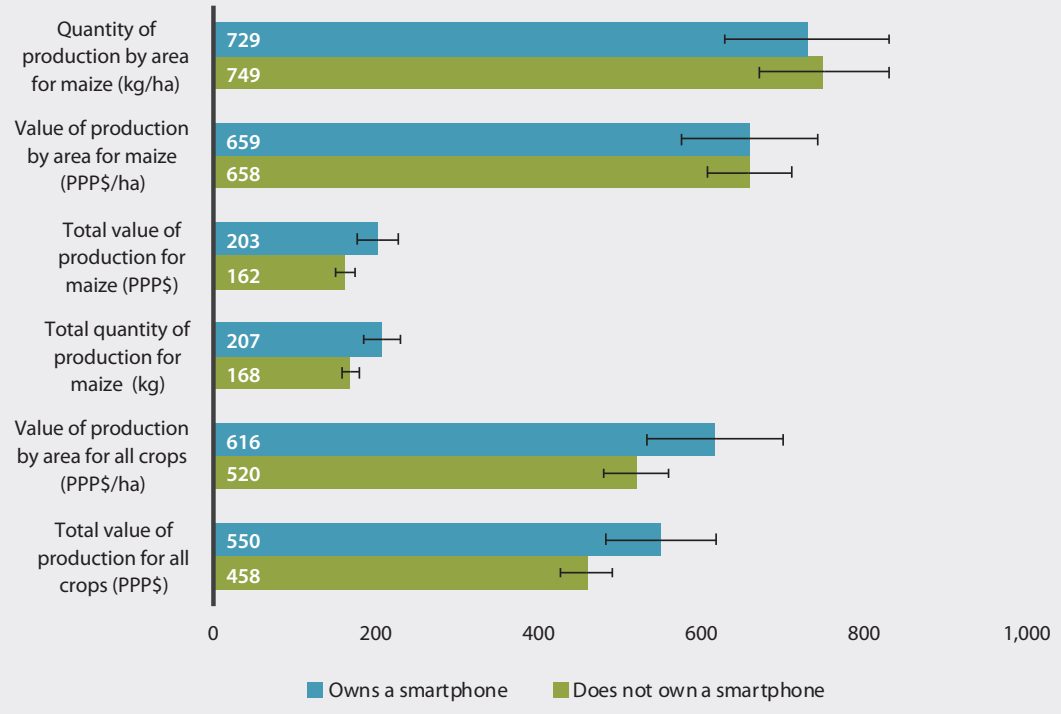
Cell-phone ownership and, in particular, smartphone ownership may provide plot managers with distinct advantages in enhancing their agricultural production. However, in comparing the production outcomes of plots managed by respondents who owned cell phones versus those managed by respondents who did not,

FIGURE 3. Use of cell-phone services/applications by gender



Source: Calculated by authors based on primary survey data.
Notes: The sample included 819 men and 889 women who managed at least one cultivated plot. The differences between men and women for all uses were found to be significant ($p < 0.1$). Confidence intervals are shown at the 90 percent level.

FIGURE 4. Mean differences in crop production based on whether or not plot manager owns a smartphone



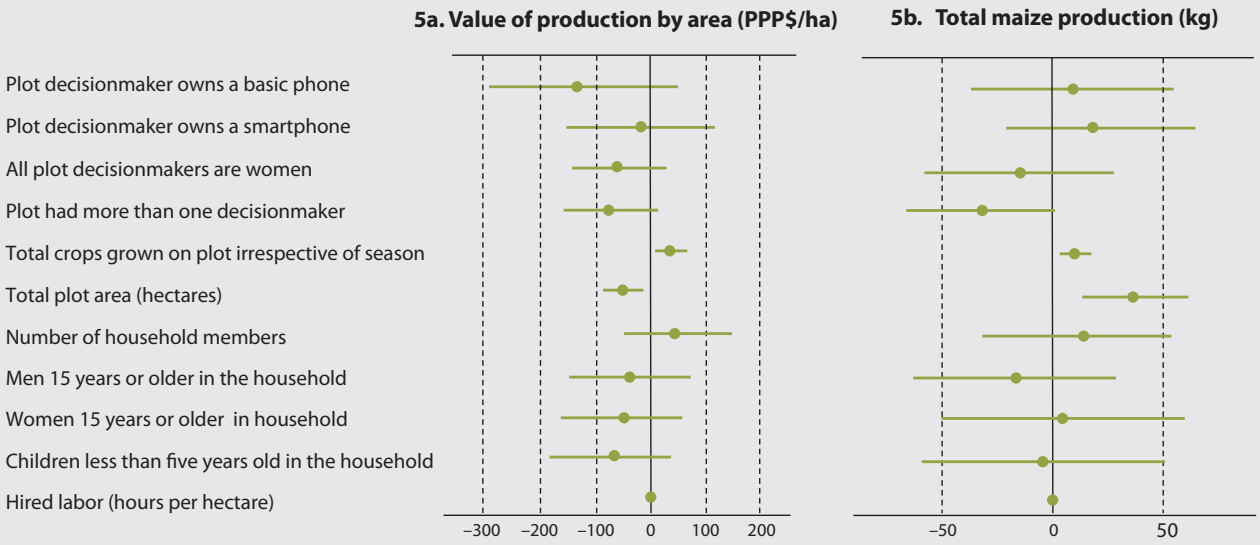
Source: Calculated by authors based on primary survey data.
Notes: The sample included 979 plots whose managers owned a smartphone and 291 plots whose managers did not own a smartphone. Gender differences were found to be significant for "Value of all crops (PPP$)." Confidence intervals are shown at the 90 percent level.

there was no evidence of differences. On the other hand, in comparing outcomes between plots managed by respondents who owned smartphones and those managed by respondents who did not, plots for which at least one manager owned a smartphone outperformed other plots in four of the six production outcomes (Figure 4). However, restricting the sample in this way significantly reduced the sample size, thereby eliminating the opportunity to assign statistical significance to these differences, despite their magnitude in many cases.

The Gendered Impact of Cell-Phone Ownership on Agricultural Productivity

The study's final research question was whether any of the gender-based differences in cell-phone ownership related to gender differences in agricultural productivity. The analysis involved examining the relationship between production outcomes and a host of explanatory factors, including smartphone/cell-phone ownership by at least one plot manager, and whether a plot was managed by women only (Figure 5). Results illustrate the findings, which are consistent across outcomes. While the coefficient for smartphone ownership is often positive, and the coefficient for plots managed by women only is often negative, at no time are either statistically significant. Hence, the study found no definitive evidence of gender differences in the relationship between cell-phone ownership and agricultural production and production value per hectare.

FIGURE 5. The relationship between agricultural production, smartphone ownership, and the gender of plot manager



Source: Calculated by authors based on primary data.

Notes: The sample included 1,269 plots for Figure 5a, and 650 plots for Figure 5b. Standard errors clustered at the village level. Numerous additional control variables were included. Confidence intervals at the 90 percent level are shown.

Concluding Remarks

Cell phones have inherent potential to provide smallholder farmers with timely access to agriculture-related information, which over time could transform Africa's agricultural production systems. The lack of evidence of a significant relationship between cell-phone use and agricultural production in this study does not invalidate this potential. Findings do, however, highlight issues around the type of digital technology available to smallholders. Smartphone ownership and use were rare among the sample's plot managers, especially compared with ownership and use of basic cell phones—and this was especially so for women. This means that, instead of using phones to access information via the Internet, communicate through email, participate in social media, or take advantage of digital applications ("apps"), smallholders' access, at least in the short term, will be restricted to the text- and voice-based features of basic cell phones. This is particularly true for women farmers, suggesting that policies and programs should aim not only to increase smallholder farmers' access to smartphones, but also to explicitly promote women's access as a means of closing the gender digital divide.

Further Reading

Sufian, F., G. Nico, and C. Azzarri. 2023. *Examining the Gender Digital Divide: A Case Study from Rural Bangladesh*. Gender, Climate Change, and Nutrition Integration Initiative (GCAN) Policy Note 15. Washington, DC: International Food Policy Research Institute. https://doi.org/10.2499/p15738coll2.136919

Sufian, F., G. Nico, and C. Azzarri. 2023. *Examining the Gender Digital Divide: A Case Study from Rural Nigeria*. Gender, Climate Change, and Nutrition Integration Initiative (GCAN) Policy Note 16. Washington, DC: International Food Policy Research Institute. https://doi.org/10.2499/p15738coll2.136918

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