

Violence Against Women and Household Ownership of Radios, Computers, and Phones in 20 Countries

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Objectives. To examine the relationship between household ownership of information and communication technologies (ICTs) and justifications for wife beating.

Methods. Women aged 15 to 49 years in 20 countries were surveyed via UNICEF's Multiple Indicator Cluster Surveys between 2006 and 2014. Multivariate logistic regressions accounted for individual-, household-, and structural-level variables.

Results. Household ownership of any ICT (radio, computer, fixed phone, or mobile phone but not television) was associated with increased odds of women rejecting wife beating. The largest association was with computer ownership: women in homes with a computer were more likely to reject wife beating (adjusted odds ratio [AOR]=1.81; 97.5% confidence interval [CI]=1.69, 1.93). Number of ICTs was important: women in households with 1, 2, 3, 4, and 5 ICTs (vs 0) were more likely to reject wife-beating justifications (AOR=1.10 [97.5% CI=1.03, 1.17]; AOR=1.10 [97.5% CI=1.03, 1.18]; AOR=1.19 [97.5% CI=1.11, 1.29]; AOR=1.71 [97.5% CI=1.54, 1.88]; and AOR=2.85 [97.5% CI=2.48, 3.26]; respectively).

Conclusions. Independent of household wealth, country development, and other sociodemographic factors, the more ICTs in a household, the more likely that women will reject wife-beating justifications. Policymakers and program planners should consider potential implications of ICT access relating to intimate partner violence. (*Am J Public Health*. 2017;107:1175–1181. doi:10.2105/AJPH.2017.303808)

Harmful gender norms, such as the acceptance of wife beating, are associated with negative outcomes for women. Such norms—for instance, the acceptance of wife beating to punish women who have deviated from traditional gender roles, neglected household responsibilities, or refused sex—are widespread.¹ And such attitudes appear to be linked to behavior: women's permissive attitudes toward wife beating predicted the actual experience of intimate partner violence (IPV) in 13 of 15 research sites in a World Health Organization multicountry study.²

Acknowledging the role of norms in the perpetration of violence against women, several global action plans call for the prioritization of norm change interventions.^{3,4} With varying levels of success, organizations have implemented awareness-raising campaigns,⁵ “edutainment” programs,⁶ and community-based trainings⁷ globally to

transform inequitable gender norms to reduce violence against women. These focused interventions coexist with other, sometimes unexamined, influences including the rapid expansion of information and communication technologies (ICTs), which is driving social change in multiple ways.

Information and communication technologies help reduce poverty,⁸ increase domestic productivity,⁹ improve governance,¹⁰ strengthen public service delivery,¹⁰ and boost economic growth.¹¹ They also are instruments by which women can advance

economically and politically. As such, eliminating the gender digital divide has become a global priority.¹² Specific to the present investigation, ICTs may contribute to women's empowerment by changing attitudes about women's rights and role in society. For instance, the introduction of cable television affected the status of women in rural India—it led to an increase in women's share of household decision-making, a decrease in fertility and son preference, and a substantial and long-lasting reduction in the acceptance of wife beating.¹³ Similarly, researchers linked the introduction of television into a small Amazonian community with a shift in the perception of gender and gender roles.¹⁴ Implicit in such research is the assumption that ICTs provide access to new information and exposure to other ways of life and, as a result, might alter values and norms.¹⁵

The few studies that have examined the relationship between technology and gender norms each focused on a single locale and 1 type of technology. Our study builds on this work by examining multiple ICTs in multiple locales and by offering a broader view of how norms that allow violence against women might relate to a global process driven mostly by the private sector.

METHODS

Data used in this study are from UNICEF's Multiple Indicator Cluster Surveys (MICS),

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a series of large, nationally representative household surveys in low- and middle-income countries that cover a range of demographic, health, and well-being topics. MICS reflects a shared commitment by UNICEF and national governments to regularly assess the welfare of women and children and to monitor progress toward the Millennium Development Goals. MICS also will serve as a baseline for the Sustainable Development Goals.¹⁶ A 2-stage cluster sampling procedure is used to select rural and urban households. All women aged 15 to 49 years in each household are surveyed. For further detail about MICS methodology, see UNICEF.¹⁷

We included MICS country data sets in this study if they represented a country's general population (i.e., not a subpopulation) and contained (1) the relevant technology variables (ownership of fixed phones, mobile phones, radios, televisions, and computers), (2) the module on attitudes toward wife beating, and (3) key demographic information. (Although MICS refers to the attitude module as “domestic violence,” we use the more precise phrase of “wife beating” given that the survey asked specifically and solely about wife beating.) Twenty countries met these criteria in December 2015 when we conducted analyses (Table A, available as a supplement to the online version of this article at <http://www.ajph.org>): Barbados, Belize, Bhutan, Bosnia, Costa Rica, Côte d'Ivoire, Democratic Republic of Congo, Ghana, Iraq, Kazakhstan, Laos, Macedonia, Malawi, Montenegro, Nepal, Nigeria, Serbia, Tunisia, Vietnam, and Zimbabwe. UNICEF collected 19 of the 20 country data sets between 2009 and 2014; data collection for Côte d'Ivoire occurred in 2006. Sample sizes ranged from 800 in Barbados to 27 308 in Iraq for a total of 133 843 participants. Response rates ranged from 70.4% in Barbados to 98.5% in Kazakhstan with a mean of 93.9%.

Outcome Variable, Independent Variables, and Covariates

The dependent variable of interest indicates well-being—that is, the rejection of all of the assessed justifications for wife beating. Respondents were asked whether a husband is justified in beating his wife under 5 circumstances: if she goes out without telling

TABLE 1—Descriptive Statistics of Independent Variables and Rejection of Common Justifications for Wife Beating Among Women in 20 Countries That Participated in UNICEF's Multiple Indicator Cluster Surveys: 2006–2014

| Variable | Total, % (n = 133 843) | Rejected All Wife Beating, % (n = 75 498) | P |
|------------------------------------|------------------------|---|--------|
| Type of technologies owned | | | < .001 |
| None | 10.7 | 47.7 | |
| Radio | 50.4 | 60.2 | |
| Fixed phone | 19.5 | 76.2 | |
| Television | 65.5 | 60.1 | |
| Computer | 17.7 | 80.3 | |
| Mobile phone | 79.8 | 58.8 | |
| No. of types of technologies owned | | | < .001 |
| 0 | 10.7 | 47.7 | |
| 1 | 14.9 | 48.0 | |
| 2 | 30.7 | 48.1 | |
| 3 | 25.4 | 57.9 | |
| 4 | 11.4 | 75.0 | |
| 5 | 7.0 | 88.3 | |
| Age, y | | | < .001 |
| 15–24 | 36.1 | 55.7 | |
| 25–39 | 44.5 | 56.4 | |
| 40–49 | 19.4 | 57.7 | |
| Education | | | < .001 |
| No education | 23.4 | 38.4 | |
| Primary | 30.8 | 52.7 | |
| Secondary or higher | 45.8 | 68.2 | |
| Marital status | | | < .001 |
| Ever married | 72.8 | 54.9 | |
| Never married | 27.2 | 60.4 | |
| Gender of head of household | | | < .001 |
| Female | 19.0 | 61.4 | |
| Male | 81.0 | 55.2 | |
| Education of head of household | | | < .001 |
| No education | 24.3 | 44.7 | |
| Primary | 31.5 | 56.8 | |
| Secondary or higher | 44.2 | 63.8 | |
| Region | | | < .001 |
| Rural | 59.8 | 52.7 | |
| Urban | 40.2 | 62.0 | |
| Wealth quintile | | | < .001 |
| Poorest | 22.7 | 46.5 | |
| Second | 20.2 | 53.3 | |
| Middle | 19.3 | 56.5 | |
| Fourth | 19.0 | 60.1 | |
| Richest | 18.8 | 67.9 | |
| Human Development Index | | | < .001 |
| Low | 39.3 | 55.0 | |
| Medium | 41.5 | 43.9 | |
| High | 19.2 | 86.5 | |

him, neglects the children, argues with him, refuses to have sex, or burns the food. We created a binary variable to identify respondents who replied “no” to all of the questions.

The predictor variables of interest consisted of household ownership (yes or no) of 5 types of ICTs: fixed phone, mobile phone, radio, television, and computer. In addition, we created a count variable (range = 0–5) to calculate the number of types of technology in the household.

Covariates included sociodemographic variables used in previous studies.¹⁸

Individual-level variables consisted of age, education, and marital status. Household-level variables included were gender and educational level of the head of household, and region (urban, rural).

Economic status is associated with the ownership of a variety of consumer goods. So as to not attribute to ICTs the potential effect of wealth, we included 2 measures of economic status: household wealth and the level of development of the country. For the former, we used MICS-constructed wealth quintiles for households in the study. For the latter, we used Human Development Index (HDI) rankings, which is one of the more comprehensive indices of a country’s development.¹⁹ We included HDI rankings corresponding to the year of MICS data collection for each country. United Nations Development Programme aggregates the HDI ranks into quartiles; all 20 of the countries ranked in the bottom 3 quartiles.

Data Analysis

To address the research question and assess the stability of the findings, we randomly divided the data set in 2 to create a training data set to derive the model and a test data set to establish the robustness of the results. We produced frequencies, means, and standard deviations, and conducted cross-tabulations with the Pearson χ^2 test. To test for multicollinearity, we produced a correlation matrix and calculated variance inflation factors. Scores below 10 commonly are considered acceptable²⁰; variance inflation factors for these data ranged from 1.09 to 3.02. We used multivariate logistic regression to examine the association between the outcome and key indicator variables.

We applied population weights to the data and, as was expected given the high response rates, doing so did not change the pattern of findings. To reduce the likelihood of identifying statistically spurious relationships, we applied a Bonferroni correction; the *P* level, with adjustment for multiple tests, was .025. After we conducted analyses on the training data, we ran the multivariate logistic regressions on the test data. Adjusted odds ratios (AORs) were consistent across both data sets as was the pseudo *R*-squared, affirming the stability of the model. Reported herein are findings based on the training data (*n* = 133 843).

RESULTS

As shown in Table 1, the total unweighted sample included 133 843 women aged 15 to 49 years, more than half of whom lived in rural areas (59.3%) and 41.5% of whom lived in medium-HDI countries. Men headed most households (81%), and more than half had less than a secondary education (55.8%) whereas about one quarter had no education. Women’s levels of education were similar. About three quarters (72.8%) of the sample had ever been married.

Mobile phones and televisions were the most commonly owned ICTs (79.8% and 65.5%, respectively). The modal number of ICTs owned per household was 2 and about half of the sample (56.3%) owned 2 or fewer types of technology.

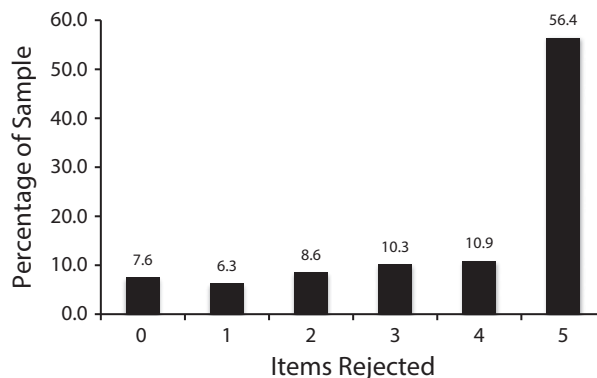
Type of Technology Owned and Rejections of Wife Beating

More than half (56.4%) of women rejected all justifications for wife beating. Respondents with any education (vs none), from urban areas (vs rural), and residing in high-HDI countries (vs low-HDI) were more likely to reject wife-beating. See Figure 1 for the distribution of number of wife-beating justifications rejected by respondents.

We used the χ^2 test to assess differences among covariates as they relate to rejecting wife-beating justifications. As reported in Table 1, all tests documented differences by demographic and other characteristics.

Table 2 reports findings from 2 logistic regressions, the first focused on the type of ICT and the second focused on the number of ICTs in a household. Both took into account the listed covariates (age, education, marital status, gender and education of the head of household, urban vs rural, household wealth quintile, and country HDI) to predict the rejection of all 5 justifications for wife beating.

Model 1, which focused on the type of technology and controls for the listed covariates, indicated that household ownership of any single technology (except television, which we later address in greater detail) was associated with an increased odds of rejecting wife beating. The positive association was consistent, and the strength of the association differed by type of technology. Ownership of computers had the strongest association:



Note. Scenarios are if she goes out without telling him, neglects the children, argues with him, refuses to have sex, or burns the food.

FIGURE 1—Number of Justifications for Wife Beating Rejected by Women in 20 Countries That Participated in UNICEF’s Multiple Indicator Cluster Surveys: 2006–2014

TABLE 2—Correlates of Rejecting Justifications for Wife Beating Among Women in 20 Countries That Participated in UNICEF’s Multiple Indicator Cluster Surveys: 2006–2014

| Predictors | Model 1, AOR (97.5% CI) | Model 2, AOR (97.5% CI) |
|--|-------------------------|-------------------------|
| Type of technologies owned (vs none) | | |
| Radio | 1.09 (1.05, 1.13) | ... |
| Fixed phone | 1.18 (1.11, 1.25) | ... |
| Television | 0.83 (0.79, 0.87) | ... |
| Computer | 1.81 (1.69, 1.93) | ... |
| Mobile phone | 1.31 (1.24, 1.38) | ... |
| No. of types of technologies owned (vs none) | | |
| 1 | ... | 1.10 (1.03, 1.17) |
| 2 | ... | 1.10 (1.03, 1.18) |
| 3 | ... | 1.19 (1.11, 1.29) |
| 4 | ... | 1.71 (1.54, 1.88) |
| 5 | ... | 2.85 (2.48, 3.26) |
| Age, y (vs 15–24) | | |
| 25–39 | 1.11 (1.06, 1.17) | 1.11 (1.04, 1.18) |
| 40–49 | 1.20 (1.14, 1.28) | 1.20 (1.11, 1.30) |
| Education (vs none) | | |
| Primary | 1.44 (1.36, 1.52) | 1.42 (1.34, 1.49) |
| Secondary or higher | 1.92 (1.81, 2.04) | 1.92 (1.81, 2.04) |
| Marital status: never married (vs ever married) | | |
| | 1.14 (1.08, 1.22) | 1.13 (1.07, 1.19) |
| Female head of household (vs male) | | |
| | 1.15 (1.10, 1.21) | 1.16 (1.11, 1.22) |
| Education of head of household (vs none) | | |
| Primary | 1.23 (1.17, 1.29) | 1.22 (1.16, 1.29) |
| Secondary or higher | 1.11 (1.03, 1.19) | 1.12 (1.06, 1.19) |
| Urban region (vs rural) | | |
| | 1.08 (1.03, 1.13) | 1.05 (1.01, 1.10) |
| Wealth quintile (vs poorest) | | |
| Second | 1.05 (0.99, 1.11) | 1.07 (1.02, 1.14) |
| Middle | 1.02 (0.96, 1.08) | 1.04 (0.89, 1.10) |
| Fourth | 1.10 (1.03, 1.18) | 1.12 (1.05, 1.19) |
| Richest | 1.13 (1.04, 1.23) | 1.17 (1.08, 1.27) |
| Human Development Index (vs low) | | |
| Medium | 0.62 (0.59, 0.65) | 0.62 (0.60, 0.65) |
| High | 3.06 (2.84, 3.31) | 3.01 (2.80, 3.24) |

Note. AOR=adjusted odds ratio; CI=confidence interval. All variables listed in the table were taken into account in the multivariate analysis.

women residing in homes with (vs without) a computer and with (vs without) a mobile phone had a substantially higher odds of rejecting wife beating (AOR = 1.81 [97.5% CI = 1.69, 1.93] and AOR = 1.31 [97.5% CI = 1.24, 1.38], respectively). Odds of rejecting wife beating also were higher if there was (vs was not) a fixed phone or a radio in the household (AOR = 1.18 [97.5% CI = 1.11, 1.25] and AOR = 1.09 [97.5% CI = 1.05, 1.13], respectively).

The negative relationship between household ownership of a television and

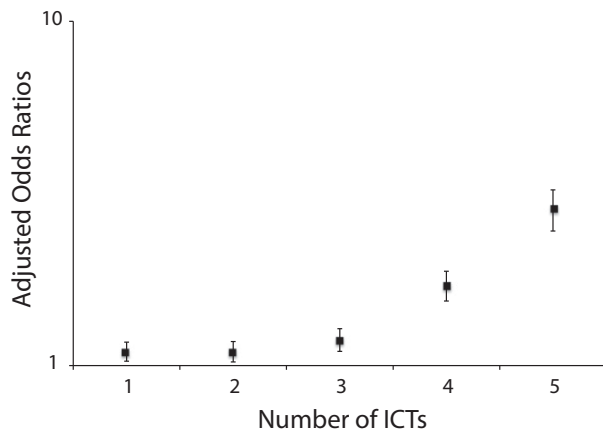
the rejection of justifications for wife beating (AOR = 0.83; 95% CI = 0.79, 0.87) is not consistent with previous literature and is opposite of the positive relationship observed in the cross-tabulations. To explore the basis of the finding, we conducted another regression with only television ownership and the sociodemographic covariates. Including the covariates reversed the observed bivariate relationship; adding the other technology ownership variables to the model strengthened the negative association.

Number of Technologies Owned and Rejections of Wife Beating

As shown in the second column of data in Table 2, the odds of rejecting justifications for wife beating increased as the number of different types of ICTs increased. Women in households with 1, 2, 3, 4, and 5 ICTs were more likely than those in households without an ICT to reject justifications for wife beating (AOR = 1.10 [97.5% CI = 1.03, 1.17]; AOR = 1.10 [97.5% CI = 1.03, 1.18]; AOR = 1.19 [97.5% CI = 1.11, 1.29]; AOR = 1.71 [97.5% CI = 1.54, 1.88]; and AOR = 2.85 [97.5% CI = 2.48, 3.26], respectively). As shown in Figure 2, the relationship was an upward curve with a slope that increased with the number of ICTs.

Findings for the covariates, which offer an understanding of the social context of the participants, were nearly identical for the 2 models; we report covariate findings for model 1 (type of technology) herein. Compared with women aged 15 to 24 years, women aged 25 to 39 years, and women aged 40 to 49 years had higher odds of rejecting the 5 justifications for wife beating (AOR = 1.11 [97.5% CI = 1.06, 1.17] and AOR = 1.20 [97.5% CI = 1.14, 1.28], respectively). Compared with women with no education, those with a primary or a secondary or higher education had a higher odds of saying “no” to the justifications (AOR = 1.44 [97.5% CI = 1.36, 1.52] and AOR = 1.92 [97.5% CI = 1.81, 2.04], respectively). Likewise, the never (vs ever) married were more likely to reject all justifications (AOR = 1.14 [97.5% CI = 1.08, 1.22]) as were those who lived in households headed by women (vs men; AOR = 1.15 [97.5% CI = 1.10, 1.21]) or an educated person (AOR = 1.23 [97.5% CI = 1.17, 1.29] for primary vs none and AOR = 1.11 [97.5% CI = 1.03, 1.19] for secondary or more vs none). Residing in an urban (vs rural) area was associated with rejecting wife-beating justifications (AOR = 1.08 [97.5% CI = 1.03, 1.13]).

Higher levels of household wealth were associated with rejecting the justifications: the second and middle quintiles did not differ from the poorest but the fourth and richest were more likely to reject the justifications (AOR = 1.10 [97.5% CI = 1.03, 1.18] and AOR = 1.13 [97.5% CI = 1.04, 1.23],



Note. ICTs = information and communication technologies: radio, fixed phone, mobile phone, television, and computer. Whiskers indicate 97.5% confidence intervals.

FIGURE 2—Adjusted Odds Ratios for Associations Between Number of Information and Communication Technologies Owned and Rejection of All 5 Justifications for Wife Beating Among Women in 20 Countries That Participated in UNICEF's Multiple Indicator Cluster Surveys: 2006–2014

respectively). Although the finding that those in medium (vs low) HDI countries had a lower odds of rejecting wife-beating justifications was unexpected, the overall household-level finding mirrored the country-level finding as well: those in high-HDI countries had substantially higher odds (AOR = 3.06 [97.5% CI = 2.84, 3.31]) of rejecting the justifications for wife beating.

When we repeated the regressions on the test sample, the pseudo *R*-squared values and adjusted ORs were consistent in direction and magnitude. This finding lends confidence in the stability of the results and reaffirms the relationship between household ownership of technology and rejecting wife beating. Nonetheless, both sets of analysis produced a low pseudo *R*-squared (0.10) suggesting that the regressions do not include important unmeasured phenomena.

DISCUSSION

Efforts to change norms commonly are deliberate processes involving public-sector interventions that target specific behaviors and beliefs. In the present investigation, we considered a largely private-sector development, the spread of ICTs. The global diffusion of these technologies has been rapid and

persistent over the past 2 decades. For example, mobile phone subscriptions have increased from 738 million in 2000 to more than 7 billion in 2015. Geographic disparities are evident; for instance, Africa lags far behind Europe (73.5 vs 120.6 mobile phone subscriptions per 100 inhabitants, respectively).²¹ Given these rates of uptake, and the remaining regional opportunities for further growth, it is important to examine associated social changes.

Information and communication technologies operate as a tool for women's empowerment through the enhancement of economic opportunities, political participation, skill building, and access to better health care and nutrition for themselves and their families.²² This study suggests another way to think about ICTs in women's lives and in social change—namely, whether ICTs serve as potential instruments of empowerment by providing access to knowledge and exposure to additional ways of conceptualizing gender roles. Thus, we examined the association between household ownership of ICTs and women's rejection of common justifications for wife beating.

When we controlled for household wealth, a country's level of development, and multiple other sociodemographic factors, household ownership of any ICT, with the exception of television, was associated with an

increased odds of women rejecting justifications for wife beating. Some ICTs had a sizable effect: women who lived in homes with a mobile phone or a computer had the greatest odds of rejecting wife beating. In addition, the more ICTs, the greater the odds of rejecting justifications for wife beating. The relationship between ICTs and the rejection of wife-beating justifications is consistent with Jensen and Oster's findings¹³ and previous ethnographic studies that linked the introduction of technology with changing gender norms.^{14,23,24} Importantly, previous studies point to a potential mechanism that links ICT ownership and attitudes toward wife beating. Access to ICTs exposes women (and men) to different ways of life and in particular different notions of women's role in society and the household. This new information may help reshape attitudes and beliefs, perhaps most notably in culturally conservative regions where traditional gender expectations are in stark contrast to the observed alternatives.

Limitations

Study findings should be considered in light of a few limitations. First, well-documented barriers to women's access to ICTs both outside and within the household²⁵ suggest that household ownership of ICTs does not necessarily mean that women within the home have access to the technologies. Second, the wealth and development indicators have limitations. Critics of MICS wealth quintiles as a measure of economic status contend that the asset-based index is urban-biased and fails to differentiate among the poorest households.²⁶ Similarly, some have criticized the HDI for omitting other indicators of human development, overlooking the importance of inequality, ignoring correlations between indicators, and for concerns about equal weighting of indicators.²⁷ Third, the cross-sectional study design can assess association but not causality. Nor can the design detect the direction of the relationship between ICT ownership and attitudes toward wife beating. Finally, this study suggests that ICTs may play a role in changing norms related to violence against women, but acknowledges that there are a host of other drivers involved. Evidence

of the influence of other factors is that 47.7% of women in households with no ICTs rejected all justifications for wife beating. Subsequent research could investigate this further.

Nonetheless, study findings offer suggestive evidence for policy and programming. With the spread of ICTs, positive changes might occur in social norms and, in particular, among those related to violence against women. The relationship between ICTs and norms may not be an obvious consideration when policymakers are strategizing the development of their ICT sector. However, this synergy may warrant attention and additional investigation to inform decision-making.

Current programmatic approaches to prevention of IPV may not consider the role technology can play in this effort. Although some organizations have attempted to harness the potential of ICTs through targeted antiviolence media campaigns (for examples, see Paluck et al.²⁸), our findings suggest that one must first consider the availability of ICTs at the household level. Multiple organizations can play a role in advocating women's increased access to technology, and practitioners can identify the ways in which these technologies can further promote changes in social norms related to violence against women.

In addition to potential positive impacts, policymakers and practitioners need to be aware of the use of ICTs to perpetrate IPV via emotionally abusive and controlling behavior.^{29,30} For example, the male head of household might restrict ICT ownership to isolate female household members from others and to prevent them from gaining information about new ways of life. Prevention, screening, and intervention efforts should include consideration of violence perpetrated through the (ab)use of technology. Moreover, the adverse effects of such use indicate that policymakers should take into account IPV via ICTs when drafting legislation that criminalizes violence against women.

With this article, we intend to begin a conversation about the relationship between technology and social norms. Future research can build upon these findings about IPV by examining access to and use of ICTs and by assessing the relationship between

ICTs and the rejection of wife beating among men.

Public Health Implications

Thinking about social norm change via public sector approaches alone is inadequate. The private sector—in this case, the global spread of ICTs—may have a role to play. Examining social change related to technologies and finding ways to harness it could have potential for reducing violence against women globally. *AJPH*

CONTRIBUTORS

L. F. Cardoso analyzed the data and drafted the article. S. B. Sorenson conceptualized the study, identified the data source, and contributed critical revisions to the article.

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HUMAN PARTICIPANT PROTECTION

UNICEF's Multiple Indicator Cluster Surveys granted permission to use the data, and the University of Pennsylvania's institutional review board exempted the study from human participant protection review because the data are publicly available and contain no identifiers.

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