

# Using Mobile Phones to Collect Daily Diary Data on Sexual Activity Among Young People in the Philippines: Acceptability and Consistency of Reporting

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**Abstract** **Purpose:** Reporting of sexual activity seems low in the Philippines is low compared to other nations. To date nearly all surveys on sexual health of Filipinos have been done with face-to-face interviews, despite growing evidence that other survey methods, especially those using familiar technologies, may elicit more responses about sensitive behaviors.

**Methods:** Mobile phone-based data collection software was used to survey 32 young adults from the 1984 CLHNS birth cohort on daily sexual activity and mood. Participants were also interviewed using traditional face-to-face and paper-based techniques, with the intent of understanding acceptability and preference for mobile phones to answer sensitive questions.

**Results:** The pilot study of young adults in Cebu revealed participants' preference for self-reporting on sensitive topics using mobile phones over traditional interview methods. Female respondents showed greater inconsistency than males across survey modalities, as well as generally low reported rates of sexual activity across the study time period.

**Conclusions:** Increased and more accurate reporting on sexual activity using novel methods has important health implications for young people in the Philippines. A larger-scale study is underway to examine reporting of sexual activity among cohabiting couples.

*Keywords:* Mobile Health, Sexual Behavior, Young Adults Mobile Data Collection, Philippines

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## Introduction

This study introduces a method for mobile data collection on sexual activity among young adults in the Philippines. The rapid development of mobile technologies in the past decade has opened new avenues for public health research, especially in developing countries and resource-poor regions where mobile technologies have “leapfrogged” ahead of developed regions in terms of near-ubiquitous penetration. For example, today there are approximately 5 billion mobile devices in use around the world, and close to two-thirds of them are in the hands of people living in emerging market economies. Numerous examples exist of technologies working toward improving medical practitioner connectivity, patient care, and collection of community and clinical health data<sup>1,2</sup>. Perhaps the most significant hallmark of such “mobile health,” or “mHealth,” is the actualizing of a theoretical shift toward a global participatory health process characterized by innovation and interdisciplinary collaboration.

However, while many ongoing public health projects address mobile-based interventions, very little research exists particularly on understanding feasibility and success of mobile-based data collection. Electronic methods of data collection, such as audio-enhanced, computer-assisted self-interviewing (A-CASI) have been increasingly used instead of paper-based methods of data collection throughout the past decade for adolescent health<sup>3-6</sup>. More recently, researchers have begun to use and assess preference of mobile electronic devices such as handheld personal digital assistants (PDAs) for collecting data in resource-poor settings<sup>7-9</sup>.

Mobile phones present an attractive alternative to PDAs in field research settings for multiple reasons, including reduced costs, the wider reach of wireless networks over fixed line internet access in low and middle-income countries lacking certain infrastructures, and increased likelihood of participant familiarity with devices (reducing training time and costs). Recent studies on mobile data collection also add advantages of mobiles over PDAs with preference for use among adolescents and young adults<sup>10</sup>, real-time detection of research-adverse events during data collection<sup>11</sup>, and reduced data loss and real-time supervision of interviewers and community health workers<sup>12</sup>.

We are interested in assessing mobile data collection feasibility and accuracy specifically in the context of sensitive health topics. In the Philippines, nearly all surveys on sexual health of adolescents and young adults have been done with face-to-face interviews, despite growing evidence from other developing countries that shows that other survey modalities may elicit more responses about sensitive behaviors<sup>6,13</sup>. Electronic surveys to report sensitive behaviors may be an alternative for young adults in a developing country that is technologically advanced, particularly with mobile technologies: The Philippines has seven times the number of mobile phones compared to landlines, and Filipinos send over 200 million cell phone text messages a day, ten times the per capita world average<sup>14</sup>.

Mobile phone-based data collection also offers the advantage of real-time answers in the diary method of Experience Sampling Methodology (ESM), as this study attempts. At the same time, the costs of technology, interviewer and field team time, as well as participant burden need to be weighed against the potential gains of using technology. While survey staff will have less data entry time with methods like ESM with mobile phones, the programming and learning curve for staff and participants can be steep.

### ***Demographic Overview:***

Evidence from the 2008 Demographic and Health Survey (DHS) from the Philippines<sup>15</sup> suggests that relative to its level of social and economic development, current use of modern contraception is low (34%), and one in three births are mistimed or unwanted. Recent evidence points to an increasing rate of abortions (despite their being illegal) [18], particularly in the Central Visayas [19], the region of study for this project. Median age at first sex is 20.5 for 25-49 year olds, according to the 2008 DHS.

### ***Frequency of Sexual Activity:***

Surveys from the Philippines show very low reported rates of sexual activity, with less than half of all 15-49 year old women (47%) and 15-55 year old men (44%) reporting sexual activity in the past four weeks<sup>16,17</sup>. Among all 20-24 year olds, the Philippines rank in the bottom quintile of countries in terms of reported sexual activity on DHS surveys<sup>15</sup> however when considering frequency of marital sexual relations, the Philippines falls in the middle of the distribution of DHS countries.

Data from the CLHNS show that more males report having had sex in the past month (among males who have ever had intercourse) compared to the DHS (46% vs. 36%). In contrast, once women have initiated sex, they have sex more often than males. The Global Study of Sexual Attitudes and Behavior reported that 42% of Filipino men and women ages 40-80 had sex more than once a week—the highest rates of any of the Asian countries studied [26]. One key difference is that this survey used self-administered questionnaires (SAQs). In comparison to other national estimates, face-to-face (FTF) interviews may lead to social desirability bias in reporting of sexual behavior compared with SAQs.

Understanding the frequency of sexual activity has important health implications. From the reproductive health perspective, sexual activity continues to be one of the least frequently measured, and perhaps among the most underutilized of Bongaarts' proximate determinants of fertility<sup>18</sup>. While coital frequency is not the whole explanation for why fertility has not declined as rapidly in the Philippines as it has in neighboring countries, underreporting of sexual activity, particularly outside of marital unions, is likely in this Catholic nation.

In addition, condom availability is sporadic in the Philippines despite increasing concern that the nation is ripe for an HIV/AIDS explosion<sup>19</sup>. In order to effectively estimate the demand for condoms (as well as modern contraceptive methods), a greater understanding of sexual activity inside and outside of marital unions is needed.

While the CLHNS and DHS have included questions on coital frequency, concerns about the quality of these data obtained in face-to-face interviews remain. We think that appropriately applied ESM is the best approach to obtaining better estimates of sexual activity.

### **Methods**

#### ***EpiSurveyor Mobile Data Collection Software:***

We used Java-enabled Nokia 3120c phones and installed EpiSurveyor software, a free data collection application developed by DataDyne, Inc. Mobile phones were purchased locally in Cebu and priced at PHP 5,185 (US\$110 at the time of the survey), and selected for being determined mid-range, fairly common devices at the time of the study. The EpiSurveyor platform was selected after piloting of several mobile data collection tools, based on its specific

design for public health data collection, and availability in free and open-source format. EpiSurveyor was downloaded to each device via GPRS prior to the study. Phones were distributed to participants following the baseline FTF interview, with password locks on the phone and application, as well as locks on the device to prevent use for outgoing calls and SMS. Survey completion took place offline, and surveys were saved to the phone SIM immediately after completion. CHWs visited participants every week to copy files from SIM to external memory cards to reduce risk of data loss. (Admittedly, the most convenient and secure method of saving survey data would be automatic uploading to the secure DataDyne server via GPRS, however we wanted to disable participants' use of web applications on the study devices). At the completion of the study survey data were exported into standard file formats (CSV and Microsoft Excel) to enable review and analysis.

### ***Study Setting and Sampling:***

Cebu, an island in the Central Visayas region, is one of the most developed provinces of the Philippines. This study focused on the Metro Cebu area, the second-largest metropolitan area in the country. The data reported here are part of the Cebu Longitudinal Health and Nutrition Survey (CLHNS), an ongoing data collection project between the UNC Carolina Population Center, Office of Population Studies in Cebu, and several American universities. The CLHNS began following all pregnant women in their sixth to seventh month of pregnancy in Cebu in 1983–1984. Follow-up has continued for these women and the birth cohort (children who were born in 1983–1984) in 1991, 1994, 1998–2000, 2002, and 2005. Our pilot study pooled participants from the CLHNS cohort, pre-selecting for men and women with cell phone ownership and residing within the Metro Cebu region.

### ***Study Design:***

Local community health workers (CHWs), four female and four male, were recruited and trained by the OPS to collect the data. Participants were CLHNS cohort members selected from 28 different barangays (municipalities) around metro Cebu. All participants were interviewed prior to the study to determine eligibility based on married/cohabiting status (half of sample), reproductive status (pregnant and breastfeeding women were excluded), and mobile phone ownership. This latter criterion was considered important to reduce participant training time and ensure proficiency and comfort with using mobile devices against the controls of face-to-face (FTF) and paper surveys. Similarly, all CHWs were proficient in mobile phone usage and were trained for one week on the data collection software and basic troubleshooting as well as general orientation on data collection techniques for the study. All CHWs had previously worked as interviewers for the OPS.

All participants were given a FTF baseline survey at the start of the study. Following the baseline, participants were given a mobile device pre-installed with the survey software and prompted via an alarm or SMS (sent from the staff phone) to fill out the survey every day for

four weeks. Half of participants were given a weekly troubleshooting phone call from a CHW. The daily surveys began with a series of questions establishing respondents' location and status. The next series of questions dealt with sexual thought and activity, and the final series of questions dealt with mood and emotions. At the conclusion of the study, all participants completed an exit survey on the phone as well as a FTF interview with a CHW or paper-based self-administered questionnaire (SAQ), reflecting on sex, contraception, and mood over the past month, as well as preferences and thoughts about using the mobile devices.

The research team devised a participant incentivizing scheme unique to the mobile focus of the study. Participants were compensated in increments of cell phone air time, colloquially known as "cell load," at intervals throughout the study: 100PHP worth of minutes at the start of the baseline interview, 200PHP at the completion of each of the 3 weeks of surveys, and 100PHP at the concluding exit interview. Participants were given load according to the cell phone service provider of their personal mobile device.

### ***Analysis***

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Given the small sample size, we did a number of bivariate analyses to assess the difference between mode of interview or data collection, stratified by sex or by union status. We report by survey mode on respondent preferences and acceptability for data collection. Next, we report the overall figures by survey mode, gender and union status in reports of sexual intercourse. We then consider whether there are statistical differences by data collection tool on the question of whether or not the participant reported any sexual intercourse in the last week. As we found no noteworthy differences between face-to-face and SAQ exit data on having had sexual intercourse, we combined the two data sources in the analysis to look at the exit interview reports. To examine within person correlation on reports of sexual activity in the past week, we used kappa analysis to assess percent agreement. Our analyses are stratified by sex and union status as we purposively sampled using these strata. All analyses were conducted using Stata v. 11.

## **RESULTS**

### ***Acceptability:***

From the exit interview asking participants to reflect on mobile data collection, 94% of respondents would rather be asked about sexual activity on a phone than use self-administered question (SAQ). 87% said they answered questions about sexual activity more honestly on the phone than with SAQ. 77% respondents preferred to answer questions on mood with a phone compared with SAQ (60% of males, 94% of females  $p=0.025$ ) and 77% said they answered questions more honestly on the phone.

### ***Reporting by Survey Method by Gender and Union Status***

Table 1 shows the percentage of young adults who reported sexual activity in the past week at three time points—baseline (before ESM), during the final week of the ESM (on phones) and at the exit interview reflecting on the prior week (face-to-face or SAQ).

When participants were asked about whether they had sexual intercourse in the past week at baseline, 31.2% of the sample reported that they did. More males reported sexual intercourse in the past week than females (37.5% vs. 25%) and more people in union reported sex than not in union (50% vs. 6.7%,  $p=0.006$  from Fisher's exact test).

During the last week of ESM, 45.2% of the sample reported sexual intercourse according to daily dairies. Nearly identical proportions of men reported sexual intercourse compared to women (46.7% vs. 43.7%), while more than half of the people in union (62.5%) reported sexual intercourse compared with those who were single (26.7%,  $p=0.03$  from Fisher's exact test).

Finally, according the exit interview, which was done either face-to-face or with a SAQ, 35.5% of respondents reported sexual intercourse in the last week. Among males, 26.7% reported sexual intercourse compared with 43.7% of females, while 56.2% of participants ever in union reported sexual intercourse compared with 13.3% of single participants ( $p=0.009$  from Fisher's exact test).

### ***Comparing Reports by Survey Method***

In addition to comparing results within survey mode by participant type, we also can compare reports of sexual intercourse between survey modes. We looked at paired data using percent agreement and kappa.

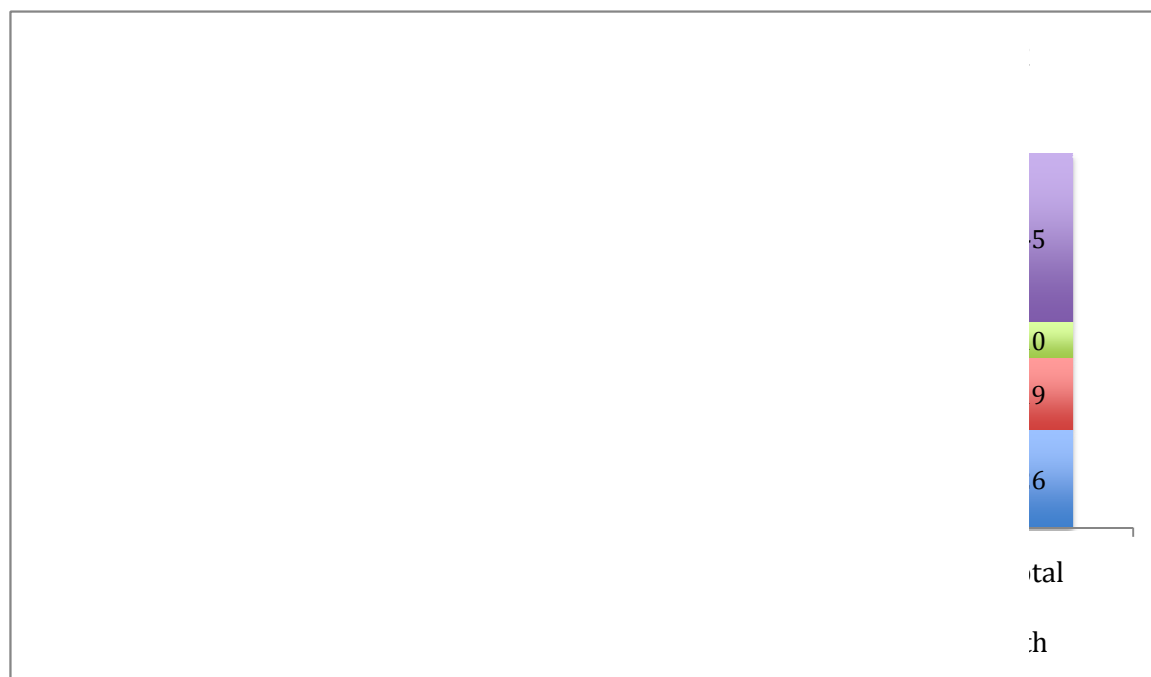
In our overall analysis, we found higher reporting of sexual intercourse on ESM (45.2%). However the proportion was not statistically higher than reports from the baseline interview (31.2%) or the exit interview (35.5%). In part, this lack of significance is due to small sample sizes.

**Table 1: Percentage reporting sexual activity and percent agreement in the last week, by survey mode, gender, and union status**

	<b>Male n (%) (n=15)</b>	<b>Female n (%) (n=16)</b>	<b>Single n (%) (n=15)</b>	<b>Ever In Union n (%) (n=16)</b>	<b>Total</b>
<b>Had Sexual Intercourse in the Last Week</b>					
<b>Baseline</b>	6 (37.5%)	4 (25.0%)	1 (6.7%)	8 (50.0%)	10 (31.2%)
<b>ESM</b>	7 (46.7%)	7 (43.7%)	4 (26.7%)	10 (62.5%)	14 (45.2%)
<b>Exit</b>	4 (26.7%)	7 (43.7%)	2 (13.3%)	9 (56.2%)	11 (35.5%)
	Male	Female	Single	Ever In	

	% Agreement	% Agreement	% Agreement	Union % Agreement	
<b>Had Sexual Intercourse in the Last Week</b>					
<b>Baseline vs. ESM</b>	73.3%	56.2%	80.0%	50.0%	54.5%
<b>Baseline vs. Exit</b>	93.3%	81.2%	93.3%	81.2%	87.1%
<b>ESM vs. Exit</b>	80.0%	62.5%	73.3%	68.7%	70.9%

Overall, we find moderate agreement in reporting on sexual intercourse. We find that in all three comparisons, the agreement is beyond chance alone. When comparing the baseline to the ESM, the percent agreement is 54.5% ( $p=0.06$ ). Comparisons of the baseline vs. exit interview show a percent agreement of 87.1 ( $p=0.0001$ ) and percent agreement of ESM vs. exit interview is 71.0% ( $p=0.01$ ). However, agreement across survey methods is not 100%--part of the discordance may be due to reporting on a different time period (i.e. the baseline reports refer to the week before the baseline, while the ESM reports refer to the last week of the ESM data collection) and some could be the mode of survey methods. When looking at the subgroups, there is the suggestion that agreement is lower in females than males, and lower among those ever in union than young adults who were single.



The figure displays our data in a different fashion to illustrate the agreement between reporting on the last week of ESM and exit interview data, which is the same reporting period but using different survey methods. We find that overall, the agreement on exit interview and the last week of ESM is 71% (like in Table 1) based on 26% of respondents reporting that they had sexual intercourse in the past week and 45% reporting that they did not have sexual intercourse. Nineteen percent reported sexual intercourse on the ESM only, and 10% reported sexual intercourse on the exit interview only.

When analyzed by gender, we see some interesting differences. While males reported 80% agreement between surveys modes, (27% yes on both, 53% no on both) female agreement was lower at 63% (25% yes on both, 38% no on both). There were no males who reported yes only on the exit interview and 20% who reported yes only on ESM. In contrast, half of the discordance among females is that they said yes on the ESM survey only, and half said that they had sexual intercourse on the exit only.

When analyzed by union status, we find that overall the percent agreement is similar but among single young adults, 67% of the total 74% agreement is among those who report not having sexual intercourse on both surveys. In contrast, the 69% agreement among those ever in union is primarily among those who said they had intercourse in the last week on both methods (44%). Nineteen percent of those ever in union and 20% of single young adults reported sexual intercourse in the last week on the ESM only, while 13% of those ever in union and 7% of singles reported sexual intercourse on the exit interview only.

## **Discussion:**

Perriera describes the process of cosmopolitanization and democratization facilitated by mobile technologies in creating a dynamic and diasporic community of mobile phone users [27]. In the Philippine context, extraordinary text messaging rates and the use of mobile mediums for mass political organizing, e.g. the technology-driven citizen coup of former President Estrada in 2001, offer exciting potential in the health arena.

We used mobile phone-based surveys to collect data on sexual activity of young adults. The software application enhanced real-time collection of data on sensitive topics in the diary methodology style. We were able to implement this survey with low direct cost of materials, with mid-market mobile phones and free data collection software.

As with all technology-based data collection tools, this particular mobile platform and methodology did not come without risks of data loss and participant compliance. Participants receiving a “push” text message or alarm notification are still entrusted to respond to daily surveys in an independent fashion according to the diary method. We also experienced the data loss accompanying the misuse and breaking of one device belonging to a male participant. Other mobile data collection projects report similar inherent risks and cons of using expensive



technological tools such as PDAs [39,40]. A more thorough and incremental incentivizing scheme might assist in increasing participant compliance and reducing data loss.

Many mobile phone users in rural settings use their devices in some sort of sharing capacity: constraints such as “no load” (no minutes remaining on phone card) or “low batt” may require sharing with other household members. A study of young Filipino adult phone use explains most respondents indicated a willingness to share their devices, despite widespread ownership [27]. In mobile data collection studies, then, such practices must be considered; despite distribution of devices by the research team, a phone culture of device sharing may impinge upon confidentiality efforts and perhaps increase participants’ reluctance to report on sensitive topics.

Our pilot participants reported a strong preference for mobile phone data collection over self-administered questionnaires, and reported their answers were more honest on mobile phones. Preference for reporting on the devices over direct interviews bolsters our argument for self-reporting and diary methodologies on questions involving sex and emotions. Furthermore, reported rates of sexual activity tended to be higher than on ESM than other interview methods, which suggests that this may be a good method to address sensitive issue in data collection.

While this was just a pilot with a very small sample size, we find some trends that may prove significant in larger samples. First, we find that males are more likely to report sexual intercourse on the ESM method than other survey methods. In contrast, females were equally as likely to report sexual intercourse on the ESM and exit interviews. However, we find that the percent agreement between ESM and exit is higher among males (80%) compared with females (62.5%). It is possible that males are more sensitive to consistency in reporting, or perhaps, that females are less comfortable with reporting sexual intercourse on the phone on a daily basis, and lack of comfort may lead to lower consistency and agreement across methods.

### ***Future Directions:***

The key limitation of our data is sample size. Our next steps focus on issues of scale, developing the pilot scope into a larger study of up to 90 couples in metro Cebu. This data collection effort will add additional information allowing us to explore concordant and discordant reports within couples in unions. In particular, the use of cell phone technologies to assess couples’ reporting concordance would offer new perspectives on the notion of mobile connectivity enabling the reinforcement of existing social relationships.

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