
WOMEN AS BENEFICIARIES OF TELEMEDICINE AND EHEALTH SERVICES IN PERU: ACCESS AND USE OF ICT FOR HEALTH AMONG FEMALE HEALTHCARE WORKERS IN THE AREA OF EPREVENTION

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Abstract

Improving access to information and communication technologies (ICT) and the affordability of these services are prerequisites for their efficient and sustainable use in healthcare and eHealth. This article reports a survey of 239 Peruvian female health related personnel in the Andean region, to assess the role ICT play in facilitating access to health information among healthcare workers (HCWs) in the region for the prevention of infectious diseases. The survey questionnaire enquired about the HCWs' access to ICT (pre and postpaid mobile cellular telephones, residential Internet, and telecentres), their use of ICT for healthcare contact and health information retrieval, and their communication and training preferences. The only statistics calculated were frequency of responses. Ninety per cent of the participants reported having access to at least one modality and 78% reported having access to two of the three services, highlighting the increasing importance of these technologies as platforms for urban and rural HCWs to exchange health information. Female HCWs in Peru reported taking advantage of these technologies to contact their healthcare centres (67%) and to obtain health information (65%); yet, 30% mentioned having difficulty in contacting such centres. Key topics of interest for health information and training included prevention and promotion (60%) and infectious diseases (24%), especially tuberculosis, dengue and HIV/AIDS. Only 2% of respondents expressed interest in receiving training on eHealth and telemedicine.

Keywords: Telecommunications; eHealth; health personnel; women; Latin America.

Introduction

The Peruvian healthcare system is characterized by its fragmentation and inequity. Historically, the marginalization of large sections of the population has limited their access to healthcare services. This situation is particularly pronounced in rural areas of the country, where healthcare facilities lacked qualified professional staff until the 1990s.¹ The poverty, informal employment and poor living conditions of rural populations, where 60 different ethno-linguistic indigenous groups live, have widened the healthcare access gap between urban and rural settings.^{1,2}

Despite advances in infrastructural and primary care coverage in the last decades, inequities in the distribution of public subsidies and differences in healthcare costs still marginalise the most disadvantaged population groups. About 36% of the population is currently insured under the Peruvian public insurance system, and private health providers only serve a small percentage of the population.³ The epidemiological mosaic of the country aggravates the impact of healthcare access gaps. In Peru, communicable diseases, such as malaria, dengue and yellow fever, coexist with an increasing number of people with non-communicable diseases and those affected by HIV/AIDS.

Improving the access to information and communication technologies (ICT) and the affordability of these services are prerequisites for their efficient and sustainable use in healthcare, including eHealth for ePrevention and health promotion practices. Peru, like the rest of the Americas, has seen a rapid rise in the penetration of wireless services, particularly mobile cellular telephony.^{4,5} In 2013, 98.1% of the population and 77% of the homes with women heading the household

had a mobile cellular subscription.^{6,7} In rural areas, however, the subscription rate drops to 50.6% of the households.⁷ The International Telecommunication Union (ITU) notes, however, that the number of unique mobile telephone users might differ from that of active post- and prepaid subscriptions, as a single user may have multiple subscriber identification module (SIM) cards or share the use of a single subscription and SIM card among several members of a household. By owning several SIM cards, mobile cellular users in developing countries - where the prepaid modality is more commonly used - seek to avoid paying high termination fees charged for calling people using a different service provider.⁸

Growth in fixed telephone subscriptions (11.3 subscriptions per 100 inhabitants) has stagnated in Peru, due to deployment costs and increased substitution by mobile telephony. In contrast, access to the Internet is expanding, with 39.2% of the population using the service and 22.1% of households being connected to it.⁶ Thanks to increased broadband deployment and a slow reduction in service rates, the percentage of the population above 6 years old who access the Internet using public telecentres, known as ‘public cabins’ in Peru, has decreased steadily, from 23.5% in 2007 to 16.9% in 2013.⁹ Nevertheless, in rural areas, the use of telecentres for Internet access has increased slightly during the same time period, from 7.0 to 8.6% of the population. Among women, Internet use has reached 36%, with large disparities in access between those living in urban and rural areas of the country (44.2% and 8.9% respectively).¹⁰ Similarly, among households headed by women, there are significant differences in Internet access in urban (26%) and rural (0.7%) areas.¹¹ Penetration of mobile broadband among the population is still limited, with only 2.9% subscriptions per 100 inhabitants by 2013.⁶

To assess the role that ICT play in facilitating access to health information for prevention and rapid response among healthcare workers (HCWs), the Institute of Tropical Medicine Alexander von Humboldt at the Universidad Peruana Cayetano Heredia (IMT AVH UPCH) conducted a survey among health related personnel in the Andean region, under the sponsorship of the Millennium2025 Foundation. In the context of this special themed issue on Women and eHealth, this article analyses the survey data on the use of ICT for health (eHealth) among the 239 Peruvian women who participated in the survey, as a sample of HCWs in the region.

Methods

Recruitment and Participants

The selection of survey participants was not random. In January 2014, the *ePrevention in Latin America and the Caribbean Project* of the IMT AVH UPCH surveyed 404 HCWs and health related personnel from the Andean region - Bolivia, Colombia, Ecuador, Peru, and Venezuela - and 15 other countries, attending an ePrevention session held in the Province of Cajamarca, Peru. Peru had the largest representation among the survey participants, with 314 respondents (78%), of whom 239 (76%) were women. This article discusses the responses of the Peruvian women who participated in the survey. This subgroup was composed mostly of women from urban areas (93%) of Peru, with only 10 participants (4%) residing exclusively in rural settings. The participants’ age ranged from 20 to more than 60 years old, with a median age of 45 years (Table 1).

Table 1. Profile of survey respondents.

Characteristic	Distribution	n (%)
Residence	Urban	222 (92.9)
	Rural	10 (4.2)
	Rural and urban	4 (1.7)
	Not disclosed	3 (1.3)
Age group	20-29	14 (5.9)
	30-39	68 (28.5)
	40-49	72 (30.1)
	50-59	68 (28.5)
	60+	10 (4.2)
	Not disclosed	7 (2.9)

The professional background of the Peruvian women was also diverse: 67% were healthcare providers working in nursing, general medicine, obstetrics, health promotion, and technical medical professions; the remaining 32% worked in health-related areas ranging from psychology, biology, and social work to education, engineering and informatics, with 1% not disclosing their profession.

Questionnaire

The questionnaire (Appendix 1) consisted of nine closed and two open-ended questions covering three areas of interest: 1) *Access to ICT*, which focused on the ownership of mobile cellular telephones (pre-

and/or postpaid), subscription to residential Internet service, as well as usage of public cabins (telecentres) to access the Internet; 2) *ICT use for healthcare contact and information retrieval*, which enquired about the use of mobile or Internet services to contact a healthcare centre, the ease with which this contact took place, the use of ICT to receive health information, as well as the participants' opinion on whether radio and television programmes provided health information. Finally, the questions on 3) *Communication and training preferences* asked participants about their interest in receiving health information - either through the Internet or mobile phones - in their local language, and included two open-ended questions on the type of health information they obtained from their healthcare centres and the health topics they would be interested in receiving training for in the future through distance education.

Respondents were asked to indicate if they agreed or disagreed with each statement. Internal reliability was not assessed because the purpose of the survey was simply to gather information from these HCWs about their level of access to ICT, and their use of ICT and traditional media to obtain health information.

Analysis

As a descriptive study, the only statistics calculated were frequency of responses. The small number of survey participants from rural areas (10) did not allow for the use of inferential statistics. For the open-ended questions, percentages were calculated based on those who provided a response. The content of open-ended questions was analysed qualitatively to identify trends in the health areas of greatest interest to the participants.

Results

ICT access

The survey enquired about access to mobile cellular telephony - in its prepaid and postpaid modalities - and to Internet service, both at the household and through telecentres. Table 2 shows the results by type of service and location. Residential Internet had the highest number of subscribers (84%), followed by postpaid (50%) and prepaid mobile cellular service (37%). Only 25% of the Peruvian women surveyed used telecentres.

The increasing importance of the Internet as a communication and information retrieval medium among the women sampled is reiterated when the data are disaggregated by location; 80% of the rural women and 84% of those living in urban settings reported subscribing to residential Internet service, compared to 40% and 51%, respectively, of those subscribed to postpaid mobile telephony.

Prepaid mobile telephony and telecentres were the only services for which rural women reported a higher level of access/usage compared to their urban counterparts: 40% of rural and 36.5% of urban women owned a prepaid telephone, while 30% of rural and 24.3% of urban women used telecentres to access the Internet. The “pay-as-you-go” modality, characteristic of telecentres and prepaid mobiles, usually provides rural residents more affordable service options, freeing them also from dealing with long-term contracts and monthly bills. Of the ten rural women participating in the survey, four owned prepaid phones, four subscribed to postpaid service, and more importantly, two did not have access to this service. In total, 13 survey participants (5.4%) indicated not having access

Table 2. Profile of respondents' access to ICT services. Data are shown as the total number of respondents (n) and the percentage of respondents from that group (%) who have access to a service.

Service	ICT SUBSCRIBERS / USERS				
	All n (%)	Urban n (%)	Rural n (%)	Both n (%)	Unknown n (%)
Prepaid cell phone	89 (37.2)	81 (36.5)	4 (40)	2 (50)	2 (66.7)
Postpaid cell phone	120 (50.2)	114 (51.4)	4 (40)	1 (25)	1 (33.3)
Both pre- & postpaid	17 (7.1)	16 (7.2)	0 (0)	1 (25)	0 (0)
Telecentres	60 (25.1)	54 (24.3)	3 (30)	1 (25)	2 (66.7)
Residential Internet	201 (84.1)	187 (84.2)	8 (80)	4 (100)	2 (66.7)

to mobile cellular telephony, 4.8% of women in urban areas and 20% of women in rural areas.

The distribution of users according to the number and type of ICT services to which they had access is shown in Table 3. Of the 239 Peruvian women surveyed, 13% had access to residential Internet, telecentres and mobile cellular telephony (in one or both modalities); the majority (67%) reported using one or both of the mobile cellular telephony modalities and residential Internet, followed by 10% who had access to one or both of the cellular modalities and used telecentres. Only one respondent (0.4%) lacked access to both mobile telephony and Internet services in any modality. The most popular mix of services was postpaid mobile phone and residential Internet service (38%), followed by those who preferred the prepaid modality and residential Internet service (24%). Of the 20 respondents with access to only one service, 90% were urban women.

Table 3. ICT access by type and number of services (pre = prepaid mobile cellular telephony, post = postpaid mobile cellular telephony, tele = telecentre, Int = residential Internet).

Service	n (%)
Pre, post or both, tele and Int	31 (13.0)
Post and Int	90 (37.7)
Pre and residential Int	58 (24.3)
Pre and post and Int	12 (5.0)
Pre and tele	11 (4.6)
Post and tele	11 (4.6)
Tele and Int	3 (1.3)
Pre and post and tele	2 (0.8)
Only pre	2 (0.8)
Only post	9 (3.8)
Only tele	2 (0.8)
Only Int	7 (2.9)
Lacked access to all services	1 (0.4)

Use of ICT for healthcare contact and information retrieval

An objective of this survey was to better understand how healthcare workers are taking advantage of their access to ICT for health (eHealth), either by facilitating their contact with healthcare centres and/or by easing their retrieval of health information.

Although in this section the focus is on the use of mobile phones and the Internet for health, an additional question brings attention to the role played by traditional media (radio and television) as providers of health information. For these questions, results are also given in relation to the professional background and age group of the respondents to identify the potential impact that the level of education and/or familiarity with ICT may have on the HCWs’ use of these technologies for health.

ICT use (mobile phone or Internet) for contacting a healthcare centre

Of the 239 participants, 160 (67%) reported having used their mobile phone or the Internet to contact their healthcare centre, 66% of urban women and 70% of those in rural areas. The specific technology used to contact the healthcare centre was not requested as part of the survey. Of the health professionals, 75% of the 100 nurses, 72% of the 32 gynaecologists, and 71% of the 17 general doctors were more likely to use ICT to contact a health centre compared to only 50% of the health promotion workers who did so (Table 4). In terms of age, participants between 30 and 49 years of age reported the highest number of ICT use to contact a health centre, with 63% reporting doing so.

One third of the 239 survey respondents have faced difficulties when contacting their healthcare centre, with urban and rural residents facing equal levels of difficulty (30.2% and 30.0%, respectively). All health promotion workers and 71% of social workers reported having difficulty, while between 25 – 30% of doctors and nurses had difficulties. Technicians had the least difficulty (11%).

Age did not seem to make a difference in terms of the difficulties faced in contacting a healthcare centre; at least 20% of the respondents in each age group reported facing difficulties (Table 5).

Use of ICT (mobile phone or Internet) to receive health information

Of the 239 survey participants, 155 (65%) reported having received health information through their mobile phone or the Internet; 65% of women who live in urban areas and 60% of those in rural areas.

With the exception of those in academia (18%), all the other professional subgroups surveyed had at least 50% of their staff members using some form of ICT to receive health information (Table 4). Health promoters topped the list with 100% of the participants, followed

Table 4. Use of ICT for health, by profession. Data are shown as the total number of respondents (n) and the percentage of respondents from that group (%) who had used ICT for health.

Profession	n (%) N=239	Used ICT to contact their health centre n (%) N=160	Faced difficulties in contacting health centre n (%) N=73	Received health information via ICT n (%) N=155
Nursing /Technical nursing	100 (41.8)	75 (75.0)	28 (28.0)	65 (65.0)
OB-GYN	32 (13.4)	23 (71.9)	8 (25.0)	26 (81.3)
General doctor	17 (7.1)	12 (70.6)	5 (29.4)	12 (70.6)
Psychology	12 (5.0)	5 (41.7)	4 (33.3)	6 (50.0)
Education	11 (4.6)	3 (27.3)	5 (45.5)	2 (18.2)
Technician (medical, lab, etc.)	9 (3.8)	6 (66.7)	1 (11.1)	6 (66.7)
Biology	7 (2.9)	4 (57.1)	1 (14.3)	5 (71.4)
Social work	7 (2.9)	4 (57.1)	5 (71.4)	4 (57.1)
Other natural sciences	6 (2.5)	4 (57.1)	2 (28.6)	4 (57.1)
Engineering, IT	3 (1.3)	2 (66.7)	2 (66.7)	2 (66.7)
Health promotion	2 (0.8)	1 (50.0)	2 (100)	2 (100)
Other	30 (12.6)	19 (63.3)	9 (30.0)	18 (60.0)
Not disclosed	3 (1.3)	2 (66.7)	1 (33.3)	3 (100)

by the gynaecologists (81%). Once again, age did not seem to be a differentiating factor among the respondents, since at least half of those within each age subgroup used ICT to receive health information (Table 5).

Table 5. Use of ICT for health, by age group. Data are shown as the total number of respondents (n) and the percentage of respondents from that age group (%) who had faced difficulties in contacting health centres (N=73) or who had received health information via ICT (N=155).

Age group	Difficulty contacting health centre n (%)	Received health information via ICT n (%)
20-29	4 (28.6)	8 (57.1)
30-39	18 (26.5)	44 (64.7)
40-49	23 (31.9)	46 (63.9)
50-59	24 (35.3)	45 (66.2)
60+	2 (20.0)	6 (60.0)
Not known	2 (28.6)	6 (85.7)

Provision of health information through radio and television

Over two thirds (71%) of the 239 survey participants considered traditional media to be a source for health information. While 72% of the HCWs in urban areas agreed with this statement, only four of the ten rural HCWs did so, but the survey did not include any additional question to help explain this difference in opinion. From 40% (technicians) to 100% (social workers) of the respondents within the different professional subgroups agreed with this idea. Similarly, in terms of age group, the level of agreement with the role of traditional media reached at least 64%.

Interest in receiving health information in their local language

The respondents’ interest in receiving health information in their local language was almost unanimous (95%), regardless of location (96% urban / 90% rural), professional background (86% to 100%), or age difference (90% to 100% agreement).

Health information retrieved: Quality and topic preferences

This section analyses the responses to the two open-ended questions on the type of information participants usually obtain from their healthcare centres and the health topics they would be interested in getting distance education on.

Type of health information obtained from healthcare centres

Of the 239 survey participants, 193 (81%) answered this open-ended question. Nine percent of those respondents indicated that they did not obtain any type of information from their healthcare centres, while another 9% focused on the quality of health information provided rather than replying about the type of information retrieved. This latter group failed to find value in the health information received because it was perceived as dated, scarce, or too general.

A total of 158 respondents provided details on the type of health information they received from healthcare centres, including training and additional resources, such as brochures and statistics. These replies were categorised under eight topic areas, ranging from health prevention and promotion to health strategies, capacity building, and statistics. The distribution of the participants' responses by category is shown in Table 6.

Table 6. Type of information respondents (n=158) obtain from their health centres (CD=communicable diseases, NCD=non-communicable diseases).

Type of information	n=	%
Prevention and promotion	95	60.1
CDs (HIV/AIDS, TB, etc.)	38	24.1
Capacity building & training	31	19.6
Other	30	19.0
Administrative and legal	23	14.6
Epidemic bulletins & statistics	16	10.1
Brochures on diverse topics	16	10.1
NCDs	14	8.9

As expected, prevention and promotion - the topic of the session from which the survey respondents were selected - was the most recurrent theme on which they obtained information, resources and/or training (60%),

followed by communicable diseases (CDs), especially information on tuberculosis (TB), dengue and HIV/AIDS (24%). This interest motivated the HCWs to keep abreast of research and scientific developments (20%).

Topics of interest for future distance education courses

All 239 participants replied to this question. Their replies were classified under 12 topical areas to better reflect the breadth of topics HCWs considered important for capacity building, which ranged from community health to non-communicable diseases, and from maternal, neonatal and children's health to emergency care and alternative medicine. Communicable diseases topped the list, with 39% of responses. The mere opportunity of building capacity on health topics was considered valuable by a quarter of respondents, as shown under the category of "Other/any topic" (Table 7). Under the topics of primary care and maternal and children's health (21%, respectively), respondents expressed particular concern about health issues relating to adolescents. This subtopic crossed several of the categories included in Table 7, such as prevention of communicable diseases (HIV) and promotion activities, family medicine (family planning), maternal newborn and child health (youth pregnancy, for example), and nutrition (child obesity).

Finally, it should be noted that interest in receiving training on eHealth or sub-components such as mHealth or telemedicine was still incipient, with only 2% of positive replies.

Discussion

This survey provides evidence of the interest of female healthcare professionals in Peru for use of ICT to obtain health information and build their capacity to better address the health issues affecting the population. In terms of access, high subscription rates to Internet and mobile cellular telephone services among the respondents underscore the usefulness of these two technologies. They function as platforms that can be used by HCWs in urban and rural settings to exchange health information, implement ePrevention strategies, and for distance education.

It is encouraging that 90% of the respondents reported having access to Internet services and mobile

Table 7. Health topics of interest for future distance education courses (CD = communicable diseases, NCD = non-communicable diseases, MNCH = maternal newborn and child health), N=239.

Health education topic	n=	%
CDs research, monitoring, diagnosis, treatment / epidemiology	93	38.9
Other / any topic	60	25.1
Primary care/ family & community health	51	21.3
MNCH	50	20.9
Prevention & Promotion	47	19.7
NCDs (diabetes, obesity, heart & kidney diseases, cancer, mental health, etc.	47	19.7
Health services management / Administration / HR management/ healthcare quality	39	16.3
Public health	37	15.5
Emergency care / disaster response	22	9.2
Nutrition	16	6.7
Alternative medicine / occupational health	7	2.9
eHealth / mHealth / telemedicine	4	1.7

cellular technology, in one or both of their respective modalities. Yet, the nearly 10% of survey respondents who have access to only mobile telephony or Internet services, highlights the continuity of access barriers. The cost of owning equipment and the affordability of service subscriptions, although not directly addressed in the survey, remain key barriers to access among rural HCWs. This is illustrated by their higher rates of subscription to prepaid mobile telephony and their higher usage of public Internet services through telecentres, compared to their urban counterparts. As the penetration of broadband services increases in Peru, particularly of wireless broadband service - a technology identified as especially useful as a platform for eHealth services - it is important for the government to consider the provision of subsidies or incentives to ensure the affordability of such services among rural HCWs and reduce existing access gaps.

In terms of ICT usage, the survey results clearly indicate that female HCWs in Peru are taking advantage of these technologies to contact their healthcare centres (67%) and to obtain health information (65%). But the results also emphasise the difficulties that at least 30% of those surveyed faced in contacting such centres. Regretfully, the questionnaire did not enquire about the specific nature of such difficulties - technical problems with the use of ICT, lack of personnel at the health centre, or some other factor - thus impeding the identification of potential

areas for improvement.

Results for the question on the usefulness of traditional media as a source of health information (71% agreement) and the respondents' interest in receiving health information in their local language (95%) were not surprising. This relates to the wide penetration of traditional media in Peru and the large number of indigenous groups in the country.

Similarly, the respondents' interest in receiving information and training on the areas of communicable diseases and prevention and promotion reflects health priority areas for the country, as well as particular interests of the group from which the sample was drawn. In general, respondents were enthusiastic about building capacity on a spectrum of areas within the continuum of care, giving emphasis to health problems affecting youth. Taking into consideration the valuable resources that telemedicine and e- and mHealth applications could provide in helping these HCWs address priority health areas, it is surprising that such a small percentage of participants (2%) included eHealth and telemedicine as areas of interest for future training. This finding underscores the need to raise awareness among HCWs about the potential benefits of ICT.

Finally, further research is needed on the impact that reduced access to ICT services might have on the ability of rural HCWs to obtain health information and implement ePrevention practices.

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Appendix A

Survey Questionnaire

1. Do you own a prepaid mobile cellular phone? Yes / No
2. Do you own a postpaid mobile cellular phone? Yes / No
3. Do you use the Internet at home? Yes / No
4. Do you use public cabins i.e. telecentres to access Internet services? Yes / No
5. Do you use your mobile phone or the Internet to communicate with your health centre? Yes / No
6. Do you receive health information in your mobile phone or via the Internet? Yes / No
7. Would you like to receive health information in your own language (local language) through your mobile or the Internet? Yes / No
8. Do radio and TV programmes provide information on health related topics? Yes / No
9. Do you face any difficulties contacting your health centre? Yes / No
10. What type of information do you receive from your health centre?
11. What type of health related courses would you be interested in taking using distance education?
12. Demographic data:
 - Gender
 - Do you live in an urban area? Yes / No
 - Do you live in a rural area? Yes / No
 - Do you live outside the country (Peru)? Yes / No
 - If yes, provide the country of origin
 - Age
 - Profession