

## **Digital poverty: An analytical framework**

Paper presented to the 17<sup>th</sup> Biennial Conference of the  
International Telecommunications Society

Montreal, June 2008

*Draft (please do not cite without permission)*

Roxana Barrantes  
*Instituto de Estudios Peruanos*  
[roxbarrantes@iep.org.pe](mailto:roxbarrantes@iep.org.pe)

# Digital poverty: An analytical framework

Roxana Barrantes  
*Instituto de Estudios Peruanos*  
[roxbarrantes@iep.org.pe](mailto:roxbarrantes@iep.org.pe)

## Abstract

In LDCs, internet access is praised as close to a panacea in order to take people out of poverty. As a consequence, policy makers usually aim at extending internet coverage disregarding the conditions necessary to better use the internet, such as literacy and people's attitudes towards technology. To address the difficulties individuals have in attaining meaningful internet use, a framework is developed along three variables: connectivity; human capital – age and education; and type of internet use – active or passive. The framework allows us to classify the population in four groups: extremely digitally poor, digitally poor, connected, and digitally wealthy. Using econometric analysis, determinants of belonging to each category can be understood and better policies for internet inclusion can be designed.

This framework for assessing digital poverty among individuals was tested through the use of an ad hoc survey. After classifying individuals according to the kinds of ICTs they use, different types of internet users are classified on the basis of interaction or functionality. The probability of belonging to each group is then explained by a set of indicators of human capital and economic poverty, controlling for the effects of household geographic location. The econometric results confirm the hypotheses on the importance of age and education: the more education that individuals have, the higher the probability that they will be digitally wealthy, while the older they are, the higher the probability that they will be digitally poor.

*Keywords: digital poverty, ICT, Internet use*

## Introduction<sup>1</sup>

Recent developments in ICTs, coupled with increased access in different socio-economic sectors and through different media, could lead one to believe that the problem of access will solve itself through the passage of time or when digital natives come to represent the majority. While this approach may seem highly reasonable, the scarcity of resources and other more pressing decisions needed to attend to the needs of the poor in developing countries make it crucial in this time of transition to adopt measures specifically aimed at the digital inclusion of those who are currently excluded. Understanding the reasons behind this exclusion is essential for designing effective policies.

---

<sup>1</sup> I wish to thank the IDRC, through its support to DIRSI, for providing financial support to gather this data. For able research assistance, I thank María Kathia Cárdenas. Lori Nordstrom deserved special thanks for editing. Errors are my responsibility.

This study, through the application of an ad hoc conceptual framework,<sup>2</sup> seeks to identify determinants of internet use based on a classification of the population along three basic variables: connectivity, education and age. This leads to the definition of four different categories of people: extremely digitally poor, digitally poor, connected and digitally wealthy.

In the following section, we present the conceptual framework used for this study, followed by a description of the population studied, in order to better understand the econometric results subsequently presented. The paper concludes with final commentaries and prospects for future research.

## **1. Digital poverty: An analytical framework**

When introducing the concept of digital poverty, we are establishing that our focus is not on any type of information or communication per se, but rather on data that can be stored, made available, used and consumed by digital media. Hence, we are introducing a specific dimension: the use of computers or, more generally, digital communication technologies that broaden the equipment's functionality (e.g., the cameras, phonebooks, music players, etc., that are now part of mobile phones) in order to facilitate information and communication.

In this approach, digitally poor individuals lack the information and communication enabled by digital technologies due to a lack of knowledge about how they are used or a lack of income (a demand consideration). Technologies are the means but, at the same time, their availability is the most visible component of the demand that can be estimated.<sup>3</sup>

Therefore, digitally poor individuals are not only people with low incomes or unfulfilled basic needs with no ICT access or use; digitally poor individuals may also include people who would not be called poor on the basis of their economic conditions. Thus, there are several types of digitally poor people:

- Low-income or economically poor individuals, who do not have the minimum abilities required to use ICTs, and to whom services are not offered. There is a double restriction for ICT use: supply and ability restrictions.
- Low-income or economically poor individuals with no services available, although they have the minimum abilities required to use ICTs. There is only a supply restriction for ICT use.
- Economically poor individuals who have no demand for ICTs, although they have the minimum abilities required to use ICTs. It is precisely their lack of income that shuts them out from ICT demand. There is a demand restriction for ICT use.
- Individuals who are not economically poor but have no demand because they lack the minimum abilities required. This type of poverty appears more clearly as a generational gap.

---

<sup>2</sup> Originally developed in Barrantes (2005).

<sup>3</sup> It is interesting to note that while the minimum caloric intake does not change fundamentally over time, the minimum threshold for digital poverty may change significantly, due to technological change.

Based on this approach, marginalized sectors with low incomes are not the only digitally poor individuals. Digitally poor individuals may be those who do not use ICTs due to lack of services or lack of abilities to use them. We will use four variables to define digitally poor individuals:

1. Age. The hypothesis states that the older the person is, the more likely he/she will be a digitally poor person. It is a way of measuring human capital.
2. Education. The hypothesis states that the higher a person's educational level is, the less likely he/she will be a digitally poor person. It is the most common way of measuring human capital.
3. Available infrastructure. Radio, open television, fixed and mobile telephone services, cable television, computers, and internet access are taken into account.
4. Accomplished functionality. Functionality refers to the uses given to technology, from the mere reception of information to the full interaction involved in e-government or e-commerce transactions, as well as the creation of content.

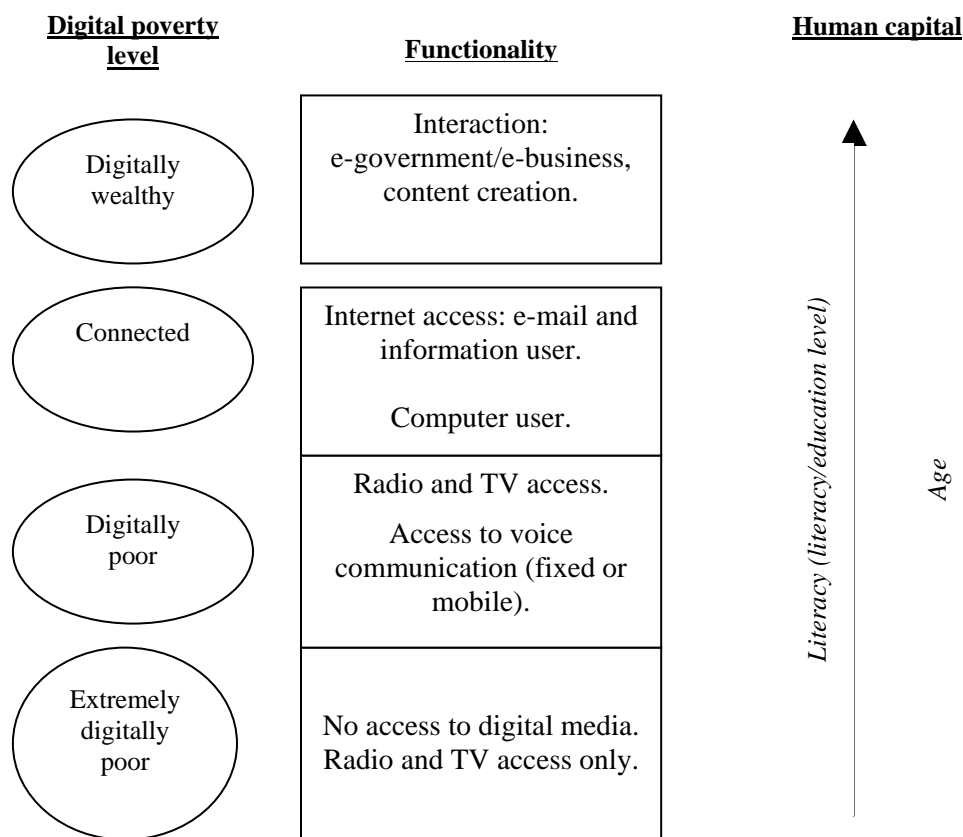
Using these four variables, it is possible for us to establish four possible categories of digital poverty:

- 1) The extremely digitally poor person will typically be someone who uses technology only for the reception of information. This may be due to lack of knowledge of its use or lack of communication services. However, even when services are available, the person's age and learning capacity may hinder his/her ability to fully use the equipment.
- 2) Digitally poor people have communication media available, so they can receive information and can communicate. However, digital media use is limited due to a lack of supply or human capital limitations, such as lower levels of education, a higher degree of illiteracy, or advanced age.
- 3) Connected people have internet access and their use is passive. This means that internet access and use substitute for traditional types of information consumption or communicating in general, instead of changing the way people interact with information providers.
- 4) Digitally wealthy people have internet access and their use is active, since the individuals in this group have the knowledge needed to make transactions or to take advantage of the government's electronic applications, or other forms implying interaction or active use of ICTs.

The taxonomy cannot be rigid if it intends to be useful. Two variables allow for a more flexible taxonomy: age and economic poverty. On the one hand, economically poor young people living in areas with no connectivity (supply problem) cannot possibly belong to level 4, although they may be perfectly capable of actively using ICTs. On the other hand, it is difficult for older people who are not poor to be classified at level 4, due to the usual difficulties in the learning process among the elderly.

This discussion is summarized in Figure 1, which lists some considerations taken into account when classifying digital poverty levels, using the arrows located at the right to show the variables of human capital. These show greater digital wealth with higher educational levels and lower digital wealth with older age.

**Figure 1: Digital poverty level**



When compared to the methodologies used to measure economic poverty,<sup>4</sup> the approach used for measuring digital poverty is more similar to the unfulfilled basic needs approach than to the consumption deficit one. An individual who does not fulfil communication and information needs through digital means will be considered an extremely digitally poor person.

Our approach requires researching ICT use in order to determine not only the connectivity component, which is the most studied, but also actual use. In other words, if ICT demand is understood as a demand for the attributes of connectivity, consumption of information, making information available and communication, the measurement of digital poverty should estimate the dimensions of each attribute for every individual, and determine the person's fulfilment, or lack thereof, in each aspect.

This approach is useful in several respects. It begins with a definition of minimum ICT goods and services, so that policies can be better oriented as to the minimum supply that should be attained through public policies. Using gap analysis, policies are aiming at a moving target, since gaps may never close. Another useful aspect of the approach is the

<sup>4</sup> World Bank (2005).

importance given to people's capabilities and ICT functionalities. Policies that rely mostly on the ICT supply are questioned, since they may prove ineffective in taking people out of digital poverty. And, by emphasizing ICT use (or the functionality attribute), specific policies can be designed so as to broaden effective consumption of ICTs.

## **2. Description of the population studied**

### **2.1. The sample**

This analytical framework was tested through the application of a module within a survey with a broader scope. The aim of the survey was to determine differences in opportunities for people of indigenous and non-indigenous descent. A total of 1,521 individuals were interviewed from selected households in three urban centres in Peru, one in each of the country's natural geographical regions: the district of Comas in Metropolitan Lima (in the Coast region); the cities of the Urubamba River valley in Cusco (the Mountains); and the city of Pucallpa, capital of the province of Ucayali (the Rainforest).<sup>5</sup> Because these are urban locations, internet service is available in all three. After the invalid surveys were removed, the study was conducted using the 1,500 remaining surveys.

Within the general survey, which emphasized aspects related to employment, ownership of assets and poverty among individuals and the differences that can be observed between indigenous and non-indigenous people, a module was included on the use of different information and communication technologies. Respondents identified as internet users were asked additional questions about the type of use, the websites they visited most, and about the interactions involved in their use (with whom, for what purpose, etc.).

The sample is composed of 748 men and 773 women. In terms of place of residence, 504 are from Lima, 504 are from Cusco and 513 are from Ucayali. Table 1 illustrates the age range of the respondents: 426 are between the ages of 15 and 24, 362 are between 25 and 34, 323 are between 35 and 44, 227 are between 45 and 54, and 183 are between 55 and 65. Table 2 shows the educational level of the sample members: 33 have no formal schooling, 252 have a primary school education (completed or incomplete), 805 have a secondary education (completed or incomplete), 72 have a partial university education and 69 have completed university or post-graduate studies. Finally, 1,018 belong to the economically active population while 502 are unemployed or inactive.

---

<sup>5</sup> The cities are marked on a map of Peru in Figure A.1 (see Annexes).

**Table 1: Age ranges**

<i>Age range</i>	<i>%</i>	<i>Total obs. (N)</i>
15 to 24 years	28.0%	426
25 to 34 years	23.8%	362
35 to 44 years	21.2%	323
45 to 54 years	14.9%	227
55 years and over	12.0%	183
Total	100.0%	1521

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).  
Prepared by IEP.

**Table 2: Educational levels**

<i>Educational level</i>	<i>%</i>	<i>Total obs. (N)</i>
No formal schooling	2.2%	33
Incomplete primary education	9.8%	149
Completed primary education	6.8%	103
Incomplete secondary education	21.4%	325
Completed secondary education	31.6%	480
Incomplete non-university higher studies	6.8%	104
Completed non-university higher studies	12.2%	186
Incomplete university studies	4.7%	72
Completed university/ post-grad studies	4.5%	69
Total	100.0%	1521

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).  
Prepared by IEP.

### **Classification of digital poverty**

The classification of digital poverty encompasses four categories: i) extremely digitally poor, ii) digitally poor, iii) connected, and iv) digitally wealthy. The dimension of ICT use was used for the classification, leaving other dimensions of digital poverty such as age or education as independent variables.

The first category is made up of people who are not users of either the internet or telephones. The second category is made up of people who are not internet users but do use telephones.

The third category is made up of people who said that they are both telephone users and internet users, but whose internet use is what we classify as passive. In other words, they use the internet for e-mail, chatting or searching for information, but do not use it to conduct transactions, do business, interact with the government or disseminate information.

The fourth category comprises the digitally wealthy. These are people who use telephones and the internet, have an e-mail account, and make active use of the internet, for conducting transactions, doing business, interacting with the government or publishing or otherwise disseminating information. They also have basic knowledge that demonstrates a minimum of capacities for computer use.

**Table 3: Digital poverty**

<i>Digital poverty level</i>	<i>%</i>	<i>Total obs. (N)</i>
Extremely digitally poor	3.9%	59
Digitally poor	53.1%	801
Connected	40.3%	608
Digitally wealthy	2.7%	40
Total	100.0%	1508

Prepared by IEP.

As can be seen in Table 3, the categories at the two extremes account for less than 10% of the total respondents, demonstrating that over 95% of people in this urban population sample use telephones at the very least. The largest difference observed among the individuals in this sample is their use of the internet. Over half use telephones but not the internet, while over 40% use the internet at least for e-mail.

If we focus on the large difference between the digitally poor and non-digitally poor, an analysis of their socio-demographic characteristics is quite revealing. In comparison with the connected and digitally wealthy,<sup>6</sup> the digitally poor:

- Live in households with lower annual incomes.
- Include the majority of indigenous people and women in the sample.
- Support larger numbers of family members (economic dependents).
- Are older.
- Have lower levels of education and live in households where the educational level of the person with the most education is lower.
- Live outside of Lima, in households that are not connected to the public water supply and sewerage networks.
- Are proportionally more likely to be employed.
- Are proportionally less likely to have fixed telephones, mobile telephones or internet service at home.
- Have proportionally fewer relatives living abroad.

These characteristics combine to create a picture of digital poverty as dependent on the generalized poverty of the household in which the individual lives. When viewed this way, digital poverty would simply be another dimension of economic poverty.

A similar analysis was carried out comparing the extremely digitally poor with the digitally poor. In this case, the characteristics are highly similar, revealing differences between the two with regard to income levels (lower among the extremely digitally poor); residence outside Lima and migration patterns (no or very few relatives living outside the place of residence of the extremely poor); educational levels (lower among the extremely digitally poor) and illiteracy rates (higher among the extremely digitally poor). Likewise, in the comparison between the connected and digitally wealthy, it was

---

<sup>6</sup> Tables with the descriptive statistics and results of the difference of means and proportions tests for the different groups compared are provided in the Annexes.

found that the variables with the most marked differences between the two groups were lower educational levels among the survey respondents and household members with the most education and a lower proportion of people with their own mobile phones and internet access at home among connected individuals.

To summarize, the greatest differences among the categories are associated with differences in income, education, and ownership of individual and household assets.

### 3. Econometric results

To explain the probability of an individual belonging to each of the groups, based on individual and household characteristics, econometric analysis was used. In contrast to the initial application of the framework,<sup>7</sup> for which I did not have information about internet applications, this data set specifically addressed this issue. In this case, therefore, the digital poverty classification emphasized internet functionality – instead of service subscription or possession of a computer – when grouping individuals into the four categories.

Since the framework proposes an ordered classification, in which classification in one group means that a specific position in a ranking was attained, I used the generalized ordered logit (*gologit*) tool.<sup>8</sup> This is a special case of a regression where the endogenous variable is discrete, in two respects. Firstly, the dependent variable attains different values depending on a specific position in a ranking, which in turn reflects an ordinal classification where higher values for the dependent variable means a better state. Secondly, the *gologit* allows for different coefficients for the dependent variables in each grouping, meaning that the independent variables affect the dependent variable differently.<sup>9</sup>

Our hypothesis explaining individual position in the ordered classification rests on three variables: individual human capital, household human capital, and economic conditions. The empirical importance of any of them could guide policy makers into prioritizing specific policies to reduce the level of digital poverty among the population. Let us examine each of our variables in detail.

In the framework developed, *human capital* is an important variable for determining the classification of individuals into a particular level of digital wealth (or poverty). As explained, human capital works in two different ways. On the one hand, the level of education helps people in accessing and utilizing technology, so the attainment of a higher level of education is associated with a higher level of digital wealth. Therefore, I used the educational level attained by the individual. On the other hand, age works the opposite way: the younger you are, the more probable it is that you are familiar with and use ICTs. Two other individual characteristics were also controlled for: gender and indigenous descent.

Household interactions along human capital variables could be important in the level of digital wealth attained because of spillover effects among household members. The

---

<sup>7</sup> See Barrantes (2007).

<sup>8</sup> See Williams (2006).

<sup>9</sup> However, this may not be the case for every independent variable. The “autofit” option allows us to correct for this effect.

number of people in the household can be positively associated with digital wealth in two ways: the probability of having somebody else teaching you could be higher than if no family member were available, and the need for communication could be higher as well. I also used the highest educational level attained by any household member, with the hypothesis that the higher the educational level, the more likely it is for the household to be digitally wealthy since there may be spillover effects from one member to another.

Finally, I also controlled for membership in associations. The hypothesis is that such membership will increase the demand for coordination and communication.

*Economic poverty* is a main determinant of the possibility of the household accessing and using the means to obtain connectivity. Whether it is buying a TV set or an internet connection at home, how economically poor a family is determines that access. The hypothesis is that, *ceteris paribus*, the poorer the household, the higher the probability of it being classified as digitally poor. I used two indicators of economic well-being. The first is whether the individual works in the service sector. The service sector includes all the activities comprising independent labourers, such as different types of repair activities, which are very important in LDCs, particularly among the poor, and that may demand by themselves higher degrees of connectivity and more sophisticated uses, since earnings may be strictly dependent on how many tasks are arranged with clients. In these types of activities, having connectivity, so that the person can be called upon to perform the work, is fundamental to subsistence. Secondly, I used a dummy to express whether the person had a job and/or was actively looking for one; i.e., whether the person was part of the economically active population (EAP). I did not use income since it is heavily correlated with educational level.

Two more controls were included to isolate the effect of different regional economic dynamics on digital wealth. All this information and the way the indicators were measured are presented in Table 4.

**Table 4: Econometric model variables**

<i>Variable</i>	<i>Type of variable</i>	<i>Expected sign</i>	<i>Theoretical variable</i>
<b>Dependent variable</b>			
Digital poverty level	Discrete variable. Values from 1 to 4, where: 1="Extremely digitally poor", 2="Digitally poor", 3="Connected", 4="Digitally wealthy".		<b>Digital poverty level</b>
<b>Independent variables</b>			
Membership in EAP (economically active population)	Dichotomous variable, where: 1="Member of EAP", 0="Not member of EAP".	+	<b>Economic situation</b>
Economic sector	Dichotomous variable, where: 1="Works in service sector", 0="Does not work in service sector".	+	
Number of persons in household	Discrete variable. Values from 1 to 15.	+	<b>Household human capital</b>

Highest educational level in household	Discrete variable: Values from 0 to 16, where: 0="No formal schooling", 16="Completed university or post-graduate studies".	+	
Relative(s) living abroad	Dichotomous variable, where: 1="Has relative(s) living abroad", 0="Does not have relative(s) living abroad".	+	
Relative(s) living in another department (province)	Dichotomous variable, where: 1="Has relative(s) living in another department of the country", 0="Does not have relative(s) living in another department of the country".	+	
Residence in Ucayali (Pucallpa)	Dichotomous variable, where: 1= "Lives in Ucayali", 0="Does not live in Ucayali".	-	
Residence in Lima (Comas)	Dichotomous variable, where: 1= "Lives in Lima", 0="Does not live in Lima".	+	
Education	Discrete variable: Values from 0 to 16, where: 0="No formal schooling", 16="Completed university or post-graduate studies".	+	
Age	Discrete variable. Values from 15 to 65.	-	
Male gender	Dichotomous variable, where: 1= "Male gender", 0="Female gender".	+	<b>Individual human capital</b>
Indigenous language	Dichotomous variable, where: 1="Indigenous mother tongue", 0="Spanish mother tongue".	-	
Number of memberships in associations	Discrete variable. Values from 0 to 8.	+	

Prepared by IEP.

The econometric results for the generalized ordered logistic model, using the “autofit” option, are shown in Table 5, and the marginal effects in Table 6. The estimation is done by groups and is cumulative, i.e., the extremely digitally poor are run against all the other categories, the extremely digitally poor and the digitally poor taken together are run against the two remaining categories, and so on. That is why only three categories appear reported in Table 5. While using the “autofit” option, the program selects independent variables for which coefficients do not vary across groups.

**Table 5: Results of generalized ordered logit estimation**

<i>Independent variable</i>	<i>Extremely digitally poor</i>	<i>Digitally poor</i>	<i>Connected</i>
Education	0.028 (0.045)	0.205 *** (0.033)	0.162 ** (0.081)

Age	-0.016 (0.012)	-0.108 *** (0.007)	-0.049 *** (0.014)
Male gender	0.665 *** (0.132)	0.665 *** (0.132)	0.665 *** (0.132)
Indigenous language	-0.612 *** (0.182)	-0.612 *** (0.182)	-0.612 *** (0.182)
Number of persons in household	-0.030 (0.032)	-0.030 (0.032)	-0.030 (0.032)
Highest educational level in household	0.290 *** (0.036)	0.290 *** (0.036)	0.290 *** (0.036)
Relative(s) living abroad	0.313 ** (0.158)	0.313 ** (0.158)	0.313 ** (0.158)
Relative(s) living in other department	0.331 ** (0.143)	0.331 ** (0.143)	0.331 ** (0.143)
Membership in EAP	-0.209 (0.183)	-0.209 (0.183)	-0.209 (0.183)
Employment in service sector	0.260 (0.171)	0.260 (0.171)	0.260 (0.171)
Number of memberships in associations	-0.022 (0.071)	-0.022 (0.071)	-0.022 (0.071)
Residence in Ucayali (Pucallpa)	0.614 * (0.331)	-0.439 ** (0.187)	-0.895 * (0.501)
Residence in Lima (Comas)	2.598 *** (0.752)	0.003 (0.186)	-0.126 (0.366)
Constant	-0.311 (0.728)	-2.572 *** (0.482)	-7.872 *** (1.055)

N=1500

LR chi2(21)=851.35

Prob>chi2=0.000

Pseudo R2=0.306

<sup>1/</sup> \*\*\* Significance level 99%, \*\* Significance level 95%, \* Significance level 90%.

<sup>2/</sup> Standard errors in parentheses.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).

Prepared by IEP.

**Table 6: Marginal effects of generalized ordered logit estimation**

<i>Independent variable</i>	<i>Extremely digitally poor</i>	<i>Digitally poor</i>	<i>Connected</i>	<i>Digitally wealthy</i>
Education	-0.001 (0.001)	-0.028 *** (0.004)	0.025 *** (0.004)	0.004 ** (0.002)
Age	0.000 (0.000)	0.015 *** (0.001)	-0.014 *** (0.001)	-0.001 *** (0.000)
Male gender	-0.021 *** (0.004)	-0.075 *** (0.016)	0.080 *** (0.015)	0.016 *** (0.004)
Indigenous language	0.021 *** (0.008)	0.068 *** (0.019)	-0.077 *** (0.023)	-0.012 *** (0.003)
Number of persons in household	0.001 (0.001)	0.003 (0.003)	-0.004 (0.004)	-0.001 (0.001)
Highest educational level in household	-0.009 *** (0.001)	-0.032 *** (0.004)	0.034 *** (0.004)	0.007 *** (0.001)
Relative(s) living abroad	-0.009 ** (0.004)	-0.036 ** (0.018)	0.037 ** (0.018)	0.008 * (0.005)
Relative(s) living in another department	-0.011 *** (0.004)	-0.036 ** (0.016)	0.040 ** (0.017)	0.008 ** (0.004)
Membership in EAP	0.007 (0.006)	0.023 (0.020)	-0.025 (0.022)	-0.005 (0.004)
Employment in service sector	-0.008 * (0.005)	-0.029 (0.019)	0.031 (0.020)	0.006 (0.005)
Number of memberships in associations	0.001 (0.002)	0.002 (0.008)	-0.003 (0.008)	-0.001 (0.002)
Residence in Ucayali (Pucallpa)	-0.019 ** (0.008)	0.082 *** (0.026)	-0.045 * (0.026)	-0.018 *** (0.006)
Residence in Lima (Comas)	-0.049 *** (0.007)	0.048 * (0.027)	0.003 (0.026)	-0.003 (0.008)

<sup>1/</sup> \*\*\* Significance level 99%, \*\* Significance level 95%, \* Significance level 90%.

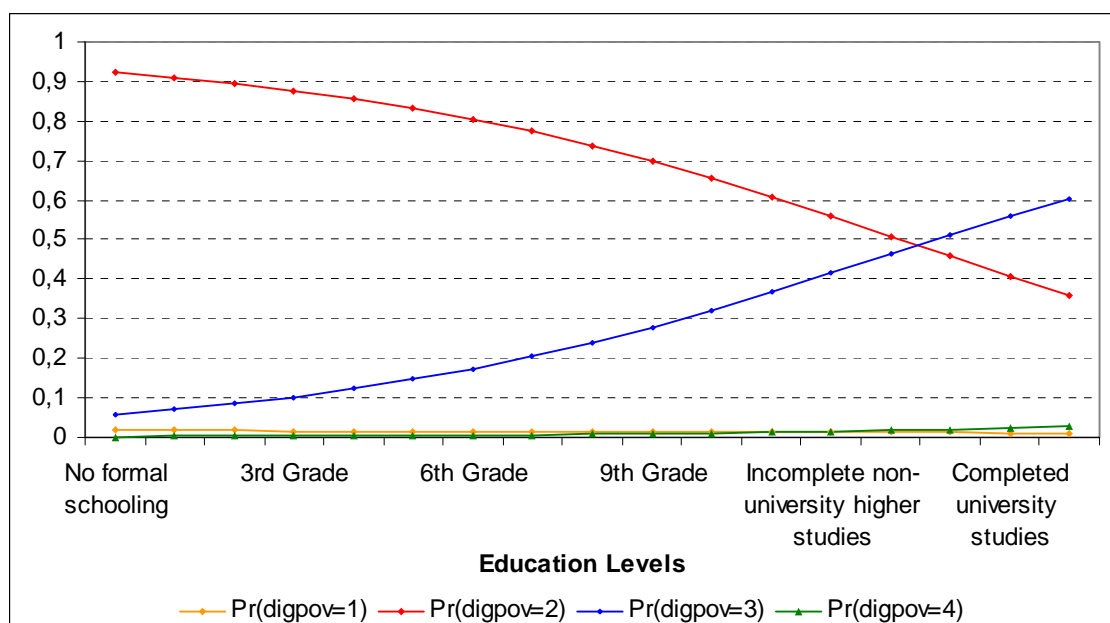
<sup>2/</sup> Standard errors in parentheses.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).

Prepared by IEP.

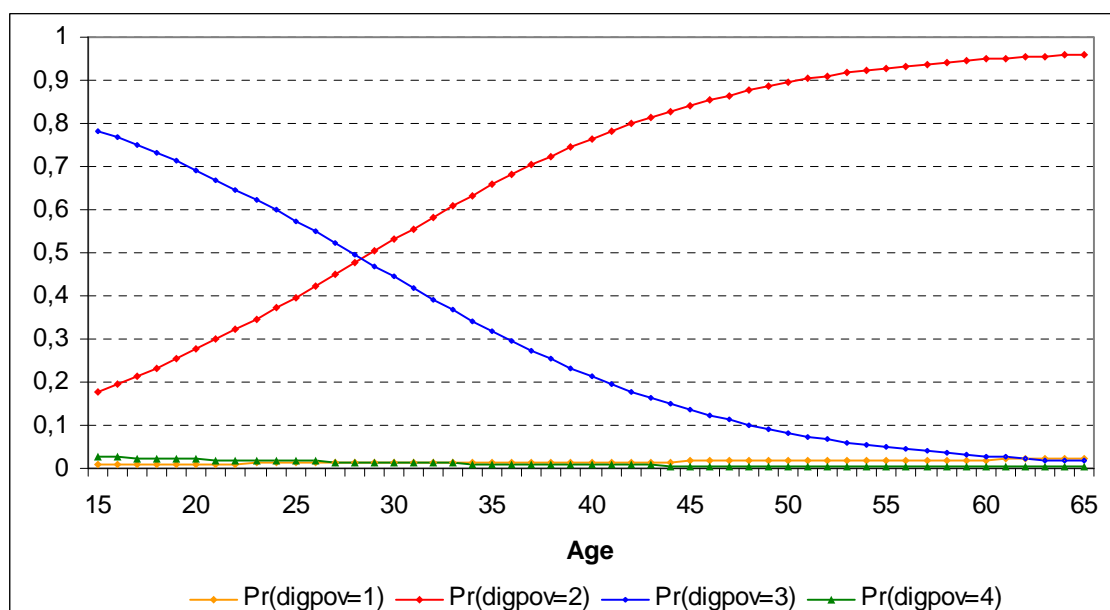
The initial hypothesis about the inverse effects of education and age were confirmed by the econometric results. Moreover, each has a differentiated effect on the probability of being classified in each category, which is particularly important in the transition from being digitally poor to being connected. These effects can be seen in Figure 2. In the sample, the educational threshold for the probability of being digitally wealthy is set at the highest education level. For age, on the other hand, the threshold is set at 28 years old, i.e. people younger than that are most probable of being digitally wealthy.

**Figure 2: Estimated probabilities of digital poverty given education**



Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).  
Prepared by IEP.

**Figure 3: Estimated probabilities of digital poverty given age**



Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).  
Prepared by IEP.

Living in Lima also has a differentiated effect on each category, particularly with regard to the use of telephony (which marks the transition from extreme digital poverty to digital poverty).

The other human capital variables are statistically significant, but the estimated parameters do not differ among categories: the highest educational level achieved by some member of the household leading to spillover effects through interactions among

all of the members; a member of the family living elsewhere (whether in another country or another department of Peru) increasing the need for communications. In our sample, being male increased the probability of being digitally wealthy, and, as would be expected, being indigenous decreased the probability.

None of the economic variables proved to be statistically significant, nor did they show the signs expected.

#### 4. Policy implications

The econometric results demonstrate the differentiated importance of age and education. If the internet is the focus of universal access policies, as is still the case in countries like Peru, it is essential for policies that promote internet access to be accompanied by specific policies to promote the inclusion of older adults, women and indigenous people, who comprise the main categories of the digitally excluded in the developing countries.<sup>10</sup> This is an especially critical point with regard to older adults, since greater age is often accompanied by lower levels of education and higher levels of illiteracy.

One question that this survey made it possible to explore was the reasons for which people do not currently use the internet. The answers provided can be found in Table 7. The majority of the digitally poor have heard of the internet but do not know how to use it. The vast majority believe that it would be useful for communicating, while its second most useful feature would be the ability to search for information (see Table 8).

**Table 7: Main reason for not using internet**

<i>Digital poverty level</i>	<i>I don't know how to use it</i>	<i>I have no use for it</i>	<i>I don't have enough money</i>	<i>I don't have enough time</i>	<i>There are no internet facilities nearby</i>	<i>Total obs. (N)</i>
Extremely digitally poor	70.8%	4.2%	4.2%	16.7%	4.2%	24
Digitally poor	66.0%	11.3%	6.6%	15.7%	0.3%	591
Total	66.2%	11.1%	6.5%	15.8%	0.5%	615

Note: The question posed in the survey is, "Why don't you use the internet?" The question was only answered by non-internet users.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).

Prepared by IEP.

<sup>10</sup> In the case of indigenous people, some of the main research studies conducted on developing countries (including Peru) coincide that this sector of the population is more prone to live in situations of extreme poverty, to face greater limitations in access to basic services, and to have completed fewer years of schooling, among other differences observed in comparison with the non-indigenous population. See Trivelli (2005), Psacharopoulos and Patrinos (1994), and Hall and Patrinos (2004).

**Table 8: Perceptions of usefulness of internet among non-users**

Digital poverty level	To communicate with other people	To search for information	To learn	To find work	Others	No answer	Total obs. (N)
Extremely digitally poor	42.9%	28.6%	19.0%	4.8%	0.0%	4.8%	21
Digitally poor	48.4%	24.5%	20.0%	3.9%	3.2%	0.0%	465
Total	48.1%	24.7%	20.0%	3.9%	3.1%	0.2%	486

Note: The question posed in the survey is, "How do you think the internet would be useful to you?" The question was only answered by respondents who said they would like to have access to the internet although they are not currently internet users.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).

Prepared by IEP.

Among internet users, the most common reason for its use is to search for information (see Table A.7 in the Annexes). The digitally wealthy demonstrate greater use of electronic government tools, since the overwhelming majority of them stated that they know that their municipality has a website, and moreover, that they have used it. It should be noted that, in this specific context, the digitally wealthy do not necessarily have computers at home.

These results demonstrate the importance of joint policies to provide access to and enhance the use of the internet. The supply of internet service per se will not bring about the universalization of internet use, unless it is accompanied by specific measures to train the population. In addition, the degree of functionality in the use of internet achieved by individuals is fundamental for the success of electronic government policies.

## Bibliography

- Barrantes, Roxana (2005). "Analysis of ICT Demand: What Is Digital Poverty and How to Measure It?" In H. Galperin and J. Mariscal (eds.), *Digital Poverty: Latin American and Caribbean Perspectives*. Ottawa, IDRC. Available at: [http://www.dirsi.net/espanol/files/02-Barrantes\\_23nov.pdf](http://www.dirsi.net/espanol/files/02-Barrantes_23nov.pdf)
- Barrantes, Roxana (2007). *Digital poverty: Concept and measurement, with an application to Peru*. Kellogg Institute. Working paper #337, March 2007. University of Notre Dame. Available at: <http://kellogg.nd.edu/publications/workingpapers/WPS/337.pdf>
- ETS (2002). *Digital Transformation: A Framework for ICT Literacy. A Report of the International ICT Literacy Panel*. Available at: <http://www.ets.org/research/ictliteracy/ictreport.pdf>. Revised May 16, 2005.
- Hall, Gillette and Anthony Harry Patrinos (eds.) (2005). *Indigenous People, Poverty and Human Development in Latin America: 1994-2004*. Washington DC: World Bank.
- Instituto de Estudios Peruanos and International Labour Organization (2007). *Encuesta Empleo, pobreza y ascendencia indígena*. Lima: Instituto de Estudios Peruanos.
- Instituto Nacional de Estadística e Informática (2007). *Encuesta Nacional de Hogares 2006*. Lima.

- ORBICOM (2003). *Monitoring the Digital Divide...and Beyond*. ORBICOM, Canadian International Development Agency, infoDev and UNESCO. Available at: [http://www.infodev.org/files/836\\_file\\_The\\_Digital\\_Divide.pdf](http://www.infodev.org/files/836_file_The_Digital_Divide.pdf). Revised May 10, 2005.
- Psacharopoulos, George and Anthony Harry Patrinos (eds.) (1994). *Indigenous People and Poverty in Latin America: An Empirical Analysis*. Washington DC: World Bank Regional and Sectoral Studies.
- Trivelli, Carolina (2005). *Los Hogares Indígenas y la Pobreza en el Perú. Una mirada a partir de la información cuantitativa*. Lima: Instituto de Estudios Peruanos. Documento de trabajo No. 141. Lima: IEP. Available at: <http://www.iep.org.pe/textos/DDT/DDT141.pdf> Revised April 22, 2008.
- Williams, Richard (2006). “Generalized Ordered Logit/Partial Proportional Odds Models for Ordinal Dependent Variables”. In: *The Stata Journal* 6(1): 58–82. A pre-publication version is available at: <http://www.nd.edu/~rwilliam/gologit2/gologit2.pdf>.
- World Bank (2005). *Poverty Manual*. Washington DC: World Bank. A version of each chapter is downloadable at: <http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/PGLP/0,,contentMDK:20284296~menuPK:461269~pagePK:64156158~piPK:64152884~theSitePK:461246,00.html> Revised April 22, 2008.

## Annexes

Figure A.1: Map of Perú and selected cities



Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).  
Prepared by IEP.

**Table A.1: Descriptive statistics by digital poverty group (digitally poor and non-digitally poor)**

Variable	Digitally poor <sup>1/</sup>						Non-digitally poor <sup>2/</sup>					
	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>Stand. dev.</i>	<i>Min.</i>	<i>Max.</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>Stand. dev.</i>	<i>Min.</i>	<i>Max.</i>
1 Estimated annual household income <sup>3/</sup>	860	15652.36	11980.94	11095.80	1806.20	72191.15	648	23550.42	19094.57	16586.65	2394.83	111231.80
2 Estimated annual household income per capita <sup>3/</sup>	860	4152.87	3119.99	3423.16	385.56	29589.02	648	6159.56	4570.59	5703.86	474.56	56735.91
3 Indigenous mother tongue <sup>4/</sup>	860	0.28	0.00	0.45	0.00	1.00	648	0.10	0.00	0.30	0.00	1.00
4 Indigenous self-identification <sup>4/</sup>	857	0.46	0.00	0.50	0.00	1.00	648	0.34	0.00	0.47	0.00	1.00
5 Number of economic dependents	851	1.91	2.00	1.89	0.00	20.00	639	1.03	0.00	1.44	0.00	6.00
6 Gender <sup>5/</sup>	860	0.43	0.00	0.50	0.00	1.00	648	0.57	1.00	0.50	0.00	1.00
7 Age	860	41.18	40.00	12.53	15.00	65.00	648	27.36	24.00	11.33	15.00	64.00
8 Residence in the department of Lima <sup>6/</sup>	860	0.29	0.00	0.45	0.00	1.00	648	0.39	0.00	0.49	0.00	1.00
9 Ability to read and write <sup>6/</sup>	857	0.94	1.00	0.24	0.00	1.00	647	1.00	1.00	0.04	0.00	1.00
10 Educational level <sup>7/</sup>	860	8.63	10.00	3.64	0.00	16.00	648	11.42	11.00	2.33	1.00	16.00
11 Employed (member of EAP) <sup>6/</sup>	860	0.67	1.00	0.47	0.00	1.00	648	0.57	1.00	0.50	0.00	1.00
12 Household connected to public water supply network <sup>6/</sup>	859	0.81	1.00	0.40	0.00	1.00	648	0.89	1.00	0.32	0.00	1.00
13 Household connected to public sewerage network <sup>6/</sup>	859	0.62	1.00	0.49	0.00	1.00	647	0.75	1.00	0.43	0.00	1.00
14 Fixed telephone in household <sup>6/</sup>	859	0.27	0.00	0.45	0.00	1.00	648	0.45	0.00	0.50	0.00	1.00
15 Mobile phone ownership <sup>6/</sup>	860	0.17	0.00	0.37	0.00	1.00	648	0.39	0.00	0.49	0.00	1.00

16	Proportion of people who work out of total number of people in household	860	0.44	0.40	0.25	0.00	1.00	648	0.47	0.50	0.23	0.00	1.00
17	Educational level of household member with the most education <sup>7/</sup>	856	11.10	11.00	2.58	0.00	16.00	646	12.72	13.00	1.83	4.00	16.00
18	Age of person with the most education	854	33.19	31.00	12.94	3.00	81.00	645	31.65	29.00	11.71	2.00	75.00
19	Relative(s) living abroad <sup>6/</sup>	860	0.20	0.00	0.40	0.00	1.00	648	0.31	0.00	0.46	0.00	1.00
20	Relative(s) living in another department of the country <sup>6/</sup>	860	0.67	1.00	0.47	0.00	1.00	648	0.71	1.00	0.45	0.00	1.00
21	Internet access at home <sup>6/</sup>	860	0.00	0.00	0.00	0.00	0.00	648	0.06	0.00	0.24	0.00	1.00

<sup>1/</sup> The “digitally poor” group includes both extremely digitally poor and digitally poor people.

<sup>2/</sup> The “non-digitally poor” group includes both connected and digitally wealthy people.

<sup>3/</sup> The annual household income variables were estimated on the basis of the ENAHO 2006 survey.

<sup>4/</sup> For cases of indigenous descent and mother tongue the variable has a value of 1, otherwise the value is 0.

<sup>5/</sup> For the male gender the variable has a value of 1, while for female gender the value is 0.

<sup>6/</sup> If the characteristic described in the name of the variable is fulfilled, it has a value of 1, otherwise the value is 0.

<sup>7/</sup> Educational level variables can have values between 0 and 16, where 0 signifies no formal schooling and 16 signifies post-graduate university studies.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).

Prepared by IEP.

**Table A.2: Results of the application of the difference of means test and test of proportions between the two groups (digitally poor and non-digitally poor)**

Variable	Test <sup>1/</sup>				Confidence interval for the difference between groups (95%)	
	<i>t-test</i>	<i>p-value</i> <sup>2/</sup>	<i>prtest</i>	<i>p-value</i> <sup>2/</sup>	<i>Lower limit</i>	<i>Upper limit</i>
1 Estimated annual household income <sup>3/</sup>	-11.061	0.000	-	-	-9298.689	-6497.433
2 Estimated annual household income per capita <sup>3/</sup>	-8.487	0.000	-	-	-2470.503	-1542.892
3 Indigenous mother tongue <sup>4/</sup>	-	-	8.510	0.000	0.140	0.215
4 Indigenous self-identificaion <sup>4/</sup>	-	-	4.532	0.000	0.067	0.165
5 Number of economic dependents	9.791	0.000	-	-	0.703	1.055
6 Gender <sup>5/</sup>	-	-	-5.145	0.000	-0.184	-0.083
7 Age	22.073	0.000	-	-	12.586	15.042
8 Residence in the department of Lima <sup>6/</sup>	-	-	-4.006	0.000	-0.146	-0.050
9 Ability to read and write <sup>6/</sup>	-	-	-6.092	0.000	-0.074	-0.042
10 Educational level <sup>7/</sup>	-16.993	0.000	-	-	-3.091	-2.451
11 Employed (member of EAP) <sup>6/</sup>	-	-	3.964	0.000	0.050	0.149
12 Household connected to public water supply network <sup>6/</sup>	-	-	-4.152	0.000	-0.115	-0.043
13 Household connected to public sewerage network <sup>6/</sup>	-	-	-5.478	0.000	-0.180	-0.087
14 Fixed telephone in household <sup>6/</sup>	-	-	-7.144	0.000	-0.226	-0.129
15 Mobile telephone ownership <sup>6/</sup>	-	-	-9.734	0.000	-0.269	-0.178
16 Proportion of people who work out of total number of people in household	-2.494	0.013	-	-	-0.057	-0.007
17 Educational level of household member with the most education <sup>7/</sup>	-13.638	0.000	-	-	-1.857	-1.390
18 Age of person with the most education	2.371	0.018	-	-	0.265	2.808
19 Relative(s) living abroad <sup>6/</sup>	-	-	-4.966	0.000	-0.156	-0.067
20 Relative(s) living in another department of the country <sup>6/</sup>	-	-	-1.568	0.117	-0.085	0.009
21 Internet access at home <sup>6/</sup>	-	-	-7.289	0.000	-0.078	-0.042

<sup>1/</sup> A test of proportions (*prtest*) was used in the case of dichotomous variables (with values of 0 or 1). A traditional difference of means test (*t-test*) was used for all other variables.

<sup>2/</sup> A *p-value*<0.05 implies a rejection of the null hypothesis of the equality of means. In other words, the means or proportions of the two groups compared are statistically different.

<sup>3/</sup> The annual household income variables were estimated on the basis of the ENAHO 2006 survey.

<sup>4/</sup> For cases of indigenous descent and mother tongue the variable has a value of 1, otherwise the value is 0.

<sup>5/</sup> For the male gender the variable has a value of 1, while for female gender the value is 0.

<sup>6/</sup> If the characteristic described in the name of the variable is fulfilled, it has a value of 1, otherwise the value is 0.

<sup>7/</sup> Educational level variables can have values between 0 and 16, where 0 signifies no formal schooling and 16 signifies post-graduate university studies.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).  
Prepared by IEP.

**Table A.3: Descriptive statistics by digital poverty group (extremely digitally poor and digitally poor)**

Variable	Group 1: Extremely digitally poor						Group 2: Digitally poor					
	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>Stand. dev.</i>	<i>Min.</i>	<i>Max.</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>Stand. dev.</i>	<i>Min.</i>	<i>Max.</i>
1 Estimated annual household income <sup>1/</sup>	59	7195.82	6615.29	3044.96	2307.49	18112.56	801	16275.25	12815.38	11218.82	1806.20	72191.15
2 Estimated annual household income per capita <sup>1/</sup>	59	2227.36	1906.34	1355.81	576.87	6577.59	801	4294.70	3223.49	3486.46	385.56	29589.02
3 Indigenous mother tongue <sup>2/</sup>	59	0.59	1.00	0.50	0.00	1.00	801	0.25	0.00	0.44	0.00	1.00
4 Indigenous self-identification <sup>2/</sup>	59	0.75	1.00	0.44	0.00	1.00	798	0.44	0.00	0.50	0.00	1.00
5 Number of economic dependents	58	1.69	1.00	1.71	0.00	5.00	793	1.93	2.00	1.91	0.00	20.00
6 Gender <sup>3/</sup>	59	0.44	0.00	0.50	0.00	1.00	801	0.43	0.00	0.50	0.00	1.00
7 Age	59	41.24	40.00	13.68	15.00	65.00	801	41.17	40.00	12.45	15.00	65.00
8 Residence in the department of Lima <sup>4/</sup>	59	0.03	0.00	0.18	0.00	1.00	801	0.31	0.00	0.46	0.00	1.00
9 Ability to read and write <sup>4/</sup>	59	0.76	1.00	0.43	0.00	1.00	798	0.95	1.00	0.21	0.00	1.00
10 Educational level <sup>5/</sup>	59	6.22	7.00	4.40	0.00	14.00	801	8.80	10.00	3.52	0.00	16.00
11 Employed (member of EAP) <sup>4/</sup>	59	0.63	1.00	0.49	0.00	1.00	801	0.67	1.00	0.47	0.00	1.00
12 Household connected to public water supply network <sup>4/</sup>	58	0.78	1.00	0.42	0.00	1.00	801	0.81	1.00	0.39	0.00	1.00
13 Household connected to public sewerage network <sup>4/</sup>	59	0.47	0.00	0.50	0.00	1.00	800	0.63	1.00	0.48	0.00	1.00
14 Fixed telephone in household <sup>4/</sup>	58	0.00	0.00	0.00	0.00	0.00	801	0.29	0.00	0.46	0.00	1.00
15 Mobile telephone ownership <sup>4/</sup>	59	0.00	0.00	0.00	0.00	0.00	801	0.18	0.00	0.39	0.00	1.00
16 Proportion of people who work out of total number of people in household	59	0.41	0.33	0.28	0.00	1.00	801	0.44	0.40	0.25	0.00	1.00

17	Educational level of household member with the most education <sup>5/</sup>	59	8.73	10.00	3.84	0.00	14.00	797	11.27	11.00	2.37	0.00	16.00
18	Age of person with the most education	58	34.74	35.00	15.94	7.00	81.00	796	33.08	31.00	12.69	3.00	72.00
19	Relative(s) living abroad <sup>4/</sup>	59	0.14	0.00	0.35	0.00	1.00	801	0.20	0.00	0.40	0.00	1.00
20	Relative(s) living in another department of the country <sup>4/</sup>	59	0.47	0.00	0.50	0.00	1.00	801	0.69	1.00	0.46	0.00	1.00
21	Internet access at home <sup>4/</sup>	59	0.00	0.00	0.00	0.00	0.00	801	0.00	0.00	0.00	0.00	0.00

<sup>1/</sup> The annual household income variables were estimated on the basis of the ENAHO 2006 survey.

<sup>2/</sup> For indigenous descent and mother tongue the variable has a value of 1, otherwise the value is 0.

<sup>3/</sup> For the male gender the variable has a value of 1, while for female gender the value is 0.

<sup>4/</sup> If the characteristic described in the name of the variable is fulfilled, it has a value of 1, otherwise the value is 0.

<sup>5/</sup> Educational level variables can have values between 0 and 16, where 0 signifies no formal schooling and 16 signifies post-graduate university studies.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO 2007).

Prepared by IEP.

**Table A.4: Results of the application of the difference of means test and test of proportions between the two groups (extremely digitally poor and digitally poor)**

Variable	Test <sup>1/</sup>				Confidence interval for the difference between groups (95%)	
	<i>t-test</i>	<i>p-value</i> <sup>2/</sup>	<i>prtest</i>	<i>p-value</i> <sup>2/</sup>	<i>Lower limit</i>	<i>Upper limit</i>
1 Estimated annual household income <sup>3/</sup>	-6.197	0.000	-	-	-11955.330	-6203.538
2 Estimated annual household income per capita <sup>3/</sup>	-4.527	0.000	-	-	-2963.566	-1171.095
3 Indigenous mother tongue <sup>4/</sup>	-	-	5.602	0.000	0.210	0.467
4 Indigenous self-identification <sup>4/</sup>	-	-	4.588	0.000	0.192	0.425
5 Number of economic dependents	-0.930	0.352	-	-	-0.745	0.266
6 Gender <sup>5/</sup>	-	-	0.130	0.896	-0.123	0.140
7 Age	0.038	0.969	-	-	-3.255	3.385
8 Residence in the department of Lima <sup>6/</sup>	-	-	-4.501	0.000	-0.332	-0.220
9 Ability to read and write <sup>6/</sup>	-	-	-5.982	0.000	-0.300	-0.081
10 Educational level <sup>7/</sup>	-5.118	0.000	-	-	-3.440	-1.533
11 Employed (member of EAP) <sup>6/</sup>	-	-	-0.661	0.509	-0.170	0.086
12 Household connected to public water supply network <sup>6/</sup>	-	-	-0.617	0.537	-0.144	0.078
13 Household connected to public sewerage network <sup>6/</sup>	-	-	-2.373	0.018	-0.287	-0.024
14 Fixed telephone in household <sup>6/</sup>	-	-	-4.854	0.000	-0.326	-0.263
15 Mobile phone ownership <sup>6/</sup>	-	-	-3.584	0.000	-0.208	-0.154
16 Proportion of people who work out of total number of people in household	-0.886	0.376	-	-	-0.097	0.037
17 Educational level of household member with the most education <sup>7/</sup>	-7.561	0.000	-	-	-3.205	-1.884
18 Age of person with the most education	0.946	0.345	-	-	-1.790	5.117
19 Relative(s) living abroad <sup>6/</sup>	-	-	-1.261	0.207	-0.160	0.024
20 Relative(s) living in another department of the country <sup>6/</sup>	-	-	-3.349	0.001	-0.343	-0.081
21 Internet access at home <sup>6/</sup>	-	-	.	.	0.000	0.000

<sup>1/</sup> A test of proportions (prtest) was used in the case of dichotomous variables (with values of 0 or 1). A traditional difference of means test (t-test) was used for all other variables.

<sup>2/</sup> A p-value <0.05 implies a rejection of the null hypothesis of the equality of means. In other words, the means or proportions of the two groups compared are statistically different.

<sup>3/</sup> The annual household income variables were estimated on the basis of the ENAHO 2006 survey.

<sup>4/</sup> For indigenous descent and mother tongue the variable has a value of 1, otherwise the value is 0.

<sup>5/</sup> For the male gender the variable has a value of 1, while for female gender the value is 0.

<sup>6/</sup> If the characteristic described in the name of the variable is fulfilled, it has a value of 1, otherwise the value is 0.

<sup>7/</sup> Educational level variables can have values between 0 and 16, where 0 signifies no formal schooling and 16 signifies post-graduate university studies.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).

Prepared by IEP.

**Table A.5: Descriptive statistics by digital poverty group (connected and digitally wealthy)**

Variable	Group 3: Connected						Group 4: Digitally wealthy					
	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>Stand. dev.</i>	<i>Min.</i>	<i>Max.</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>Stand. dev.</i>	<i>Min.</i>	<i>Max.</i>
1 Estimated annual household income <sup>1/</sup>	608	23227.32	18985.54	16373.13	2394.83	111231.80	40	28461.63	26136.62	19113.85	5550.17	84914.26
2 Estimated annual household income per capita <sup>1/</sup>	608	6112.17	4517.49	5764.23	474.56	56735.91	40	6879.96	5202.41	4693.22	1130.18	17126.75
3 Indigenous mother tongue <sup>2/</sup>	608	0.10	0.00	0.30	0.00	1.00	40	0.08	0.00	0.27	0.00	1.00
4 Indigenous self-identification <sup>2/</sup>	608	0.34	0.00	0.47	0.00	1.00	40	0.35	0.00	0.48	0.00	1.00
5 Number of economic dependents	600	1.04	0.00	1.45	0.00	6.00	39	0.97	0.00	1.27	0.00	4.00
6 Gender <sup>3/</sup>	608	0.56	1.00	0.50	0.00	1.00	40	0.63	1.00	0.49	0.00	1.00
7 Age	608	27.29	24.00	11.16	15.00	64.00	40	28.48	23.50	13.82	15.00	62.00
8 Residence in the department of Lima <sup>4/</sup>	608	0.38	0.00	0.49	0.00	1.00	40	0.45	0.00	0.50	0.00	1.00
9 Ability to read and write <sup>4/</sup>	607	1.00	1.00	0.04	0.00	1.00	40	1.00	1.00	0.00	1.00	1.00
10 Educational level <sup>5/</sup>	608	11.37	11.00	2.32	1.00	16.00	40	12.20	13.00	2.40	6.00	15.00
11 Employed (member of EAP) <sup>4/</sup>	608	0.56	1.00	0.50	0.00	1.00	40	0.68	1.00	0.47	0.00	1.00
12 Household connected to public water supply network <sup>4/</sup>	608	0.88	1.00	0.32	0.00	1.00	40	0.95	1.00	0.22	0.00	1.00
13 Household connected to public sewerage network <sup>4/</sup>	607	0.74	1.00	0.44	0.00	1.00	40	0.90	1.00	0.30	0.00	1.00
14 Fixed telephone in household <sup>4/</sup>	608	0.45	0.00	0.50	0.00	1.00	40	0.55	1.00	0.50	0.00	1.00
15 Mobile phone ownership <sup>4/</sup>	608	0.38	0.00	0.48	0.00	1.00	40	0.63	1.00	0.49	0.00	1.00

16	Proportion of people who work out of total number of people in household	608	0.47	0.50	0.23	0.00	1.00	40	0.52	0.50	0.20	0.00	1.00
17	Educational level of household member with the most education <sup>5/</sup>	606	12.68	13.00	1.83	4.00	16.00	40	13.35	13.00	1.64	8.00	16.00
18	Age of person with the most education	605	31.67	29.00	11.66	2.00	75.00	40	31.43	26.50	12.63	16.00	62.00
19	Relative(s) living abroad <sup>4/</sup>	608	0.31	0.00	0.46	0.00	1.00	40	0.30	0.00	0.46	0.00	1.00
20	Relative(s) living in another department of the country <sup>4/</sup>	608	0.72	1.00	0.45	0.00	1.00	40	0.60	1.00	0.50	0.00	1.00
21	Internet access at home <sup>4/</sup>	608	0.05	0.00	0.22	0.00	1.00	40	0.18	0.00	0.38	0.00	1.00

<sup>1/</sup> The annual household income variables were estimated on the basis of the ENAHO 2006 survey.

<sup>2/</sup> For indigenous descent and mother tongue the variable has a value of 1, otherwise the value is 0.

<sup>3/</sup> For the male gender the variable has a value of 1, while for female gender the value is 0.

<sup>4/</sup> If the characteristic described in the name of the variable is fulfilled, it has a value of 1, otherwise the value is 0.

<sup>5/</sup> Educational level variables can have values between 0 and 16, where 0 signifies no formal schooling and 16 signifies post-graduate university studies.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).

Prepared by IEP.

**Table A.6: Results of the application of the difference of means test and test of proportions between the two groups (connected and digitally wealthy)**

Variable	Test <sup>1/</sup>				Confidence interval for the difference between groups (95%)	
	<i>t-test</i>	<i>p-value</i> <sup>2/</sup>	<i>prtest</i>	<i>p-value</i> <sup>2/</sup>	<i>Lower limit</i>	<i>Upper limit</i>
1 Estimated annual household income <sup>3/</sup>	-1.937	0.053	-	-	-10539.550	70.922
2 Estimated annual household income per capita <sup>3/</sup>	-0.824	0.410	-	-	-2596.505	1060.914
3 Indigenous mother tongue <sup>4/</sup>	-	-	0.550	0.582	-0.058	0.112
4 Indigenous self-identification <sup>4/</sup>	-	-	-0.102	0.919	-0.160	0.145
5 Number of economic dependents	0.269	0.788	-	-	-0.404	0.532
6 Gender <sup>5/</sup>	-	-	-0.773	0.440	-0.218	0.093
7 Age	-0.641	0.522	-	-	-4.819	2.448
8 Residence in the department of Lima <sup>6/</sup>	-	-	-0.819	0.413	-0.224	0.094
9 Ability to read and write <sup>6/</sup>	-	-	-0.257	0.797	-0.005	0.002
10 Educational level <sup>7/</sup>	-2.203	0.028	-	-	-1.579	-0.091
11 Employed (member of EAP) <sup>6/</sup>	-	-	-1.431	0.152	-0.266	0.035
12 Household connected to public water supply network <sup>6/</sup>	-	-	-1.318	0.188	-0.141	0.004
13 Household connected to public sewerage network <sup>6/</sup>	-	-	-2.229	0.026	-0.256	-0.058
14 Fixed telephone in household <sup>6/</sup>	-	-	-1.284	0.199	-0.263	0.055
15 Mobile phone ownership <sup>6/</sup>	-	-	-3.117	0.002	-0.403	-0.093
16 Proportion of people who work out of total number of people in household	-1.378	0.169	-	-	-0.127	0.022
17 Educational level of household member with the most education <sup>7/</sup>	-2.254	0.025	-	-	-1.254	-0.086
18 Age of person with the most education	0.128	0.898	-	-	-3.512	4.001
19 Relative(s) living abroad <sup>6/</sup>	-	-	0.144	0.886	-0.136	0.158
20 Relative(s) living in another department of the country <sup>6/</sup>	-	-	1.581	0.114	-0.039	0.273
21 Internet access at home <sup>6/</sup>	-	-	-3.152	0.002	-0.241	-0.003

<sup>1/</sup> A test of proportions (*prtest*) was used in the case of dichotomous variables (with values of 0 or 1). A traditional difference of means test (*t-test*) was used for all other variables.

<sup>2/</sup> A *p-value* <0.05 implies a rejection of the null hypothesis of the equality of means. In other words, the means or proportions of the two groups compared are statistically different.

<sup>3/</sup> The annual household income variables were estimated on the basis of the ENAHO 2006 survey.

<sup>4/</sup> For indigenous descent and mother tongue the variable has a value of 1, otherwise the value is 0.

<sup>5/</sup> For the male gender the variable has a value of 1, while for female gender the value is 0.

<sup>6/</sup> If the characteristic described in the name of the variable is fulfilled, it has a value of 1, otherwise the value is 0.

<sup>7/</sup> Educational level variables can have values between 0 and 16, where 0 signifies no formal schooling and 16 signifies post-graduate university studies.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).

Prepared by IEP.

**Table A.7: What do you use the internet for?**

<i>Digital poverty level</i>	<i>To search for information</i>	<i>To chat</i>	<i>To use e-mail</i>	<i>To learn</i>	<i>To play online games</i>	<i>To listen to/download music</i>	<i>For transactions (purchases/procedures)</i>	<i>To publish/disseminate information</i>	<i>Other uses</i>	<i>No answer</i>	<i>Total obs. (N)</i>
Connected	61.0%	11.8%	8.6%	7.6%	6.4%	2.3%	0.0%	0.0%	2.0%	0.3%	608
Digitally wealthy	70.0%	12.5%	2.5%	5.0%	0.0%	2.5%	5.0%	2.5%	0.0%	0.0%	40
Total	61.6%	11.9%	8.2%	7.4%	6.0%	2.3%	0.3%	0.2%	1.9%	0.3%	648

Note: The question, “What do you use the internet for?” was only answered by respondents who are internet users.

“Other uses” include making voice calls, watching videos, and looking for work.

Source: Encuesta Empleo, pobreza y ascendencia indígena (IEP and ILO, 2007).

Prepared by IEP.