



Information and communication technology (ICT) and eHealth policy in Latin America and the Caribbean: a review of national policies and assessment of socioeconomic context

Maria Carolina Jimenez-Marroquin,¹ Raisa Deber,²
and Alejandro R. Jadad²

Suggested citation

Jimenez-Marroquin MC, Deber R, Jadad AR. Information and communication technology (ICT) and eHealth policy in Latin America and the Caribbean: a review of national policies and assessment of socioeconomic context. *Rev Panam Salud Publica*. 2014;35(5/6):329–36.

ABSTRACT

Objective. To examine the availability of national information and communication technology (ICT) or eHealth policies produced by countries in Latin America and the Caribbean (LAC), and to determine the influence of a country's socioeconomic context on the existence of these policies.

Methods. Documents describing a national ICT or eHealth policy in any of the 33 countries belonging to the LAC region as listed by the United Nations were identified from three data sources: academic databases; the Google search engine; and government agencies and representatives. The relationship between the existence of a policy and national socioeconomic indicators was also investigated.

Results. There has been some progress in the establishment of ICT and eHealth policies in the LAC region. The most useful methods for identifying the policies were 1) use of the Google search engine and 2) contact with Pan American Health Organization (PAHO) country representatives. The countries that have developed a national ICT policy seem to be more likely to have a national eHealth policy in place. There was no statistical significant association between the existence of a policy and a country's socioeconomic context.

Conclusions. Governments need to make stronger efforts to raise awareness about existing and planned ICT and eHealth policies, not only to facilitate ease of use and communication with their stakeholders, but also to promote collaborative international efforts. In addition, a better understanding of the effect of economic variables on the role that ICTs play in health sector reform efforts will help shape the vision of what can be achieved.

Key words

Health policy; information technology; Latin America; Caribbean region.

In an increasingly digital world, there is growing recognition that the health sector must integrate information and communication technologies (ICTs) at all

¹ Centre for Global eHealth Innovation, Toronto, Canada.

² Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Canada. Send correspondence to: Alejandro R. Jadad, ajadad@ehealthinnovation.org

levels, especially at a time when health systems face stringent economic challenges and growing demands to provide more and better health care services, especially to those most in need (1). ICTs might help improve health conditions in low- and middle-income countries (LMICs) by strengthening disease prevention and management efforts, or

through effects on the broader determinants of health (2).

The experience from high-income countries that have implemented large-scale ICT initiatives has shown that success is largely dependent on solid plans to harness the power of eHealth³

³ The use of ICT for the health sector.

systems and services (3, 4). It is therefore valuable for countries to develop policies that could facilitate the adoption of eHealth and guide the use of ICTs toward the achievement of the desired goals (5). It is not clear the extent to which systematic efforts have been undertaken to identify national ICT and eHealth policies developed or adopted by countries in Latin America and the Caribbean (LAC), and whether there is an association with the socioeconomic conditions of these countries.

This study examines the extent to which national ICT or eHealth policies have been created by countries in the LAC region, and explores the influence of a country's socioeconomic context on the existence of these policies. LAC is a region with diverse demographic, social, economic, and technological characteristics (6) and thus provides a good setting in which to examine whether such characteristics are related to the implementation of such policies.

MATERIALS AND METHODS

Study design

A scoping review was carried out between March and October 2010 to identify documents describing a national ICT or eHealth policy in countries listed as belonging to the LAC region according to the United Nations (UN) classification. The study protocol was approved by the research ethics board of the University of Toronto.

For the purposes of this study, a policy was defined as "a set of interrelated decisions taken by a political actor or group of actors concerning the selection of goals and the means of achieving them within a specified situation where these decisions should, in principle, be within the power of these actors to achieve" (7).

To define ICT policy and eHealth policy, previously established definitions from the literature were used. An ICT policy was defined as "a general plan on how to bring a society and its economy forward through the use of ICT" that focused on specific sectors, such as health, education, or administration (8). An eHealth policy was defined as "a set of statements, directives, regulations, laws, and judicial interpretations that direct and manage the life cycle of eHealth" (9,

10), and "a framework and approach for developing eHealth in a country, established by a government with the intent of achieving health goals" (3).

Eligibility criteria

To be considered eligible, documents had to meet both of the following criteria: were issued by the national government of any of the 33 countries listed in the LAC region by the UN; and established a clear set of goals, objectives and strategies to guide the use of ICTs at the national level (ICT policy) or in the health sector exclusively (eHealth policy).

Documents were excluded if they 1) were issued by a nongovernmental organization or a country not listed in the UN classification; 2) were applicable to any sector or in combination with other sectors (for ICT policies); 3) were applicable to a sector other than health (for eHealth policies); or 4) did not clearly state goals objectives and strategies for the use of ICTs at the national level (for ICT policies) or in the health sector exclusively (for eHealth policies).

Search strategy

The search strategy included three sources of data: academic databases; the Google search engine; and government agencies and representatives.

The search of academic databases was carried out between 18 March and 21 June 2010 and included a list of 173 terms related to the names of the countries, health policy, and ICTs. The titles and abstracts were screened for potential eligibility first, followed by a review of the full text of potentially eligible documents.

Available policies were identified directly through the Google search engine by using the following terms: [Country name] AND Policy AND eHealth OR information technologies. The Web search was carried out primarily in English and Spanish. When no relevant link resulted, the search was also conducted using the same search terms translated into Dutch, French, and Portuguese. After the main Google search was completed, the official websites of the national governments and the ministries of health and of telecommunications for each country were located online and searched for additional eligible documents.

LAC government representatives were contacted online, by phone, and face-to-face to verify the accuracy of the documents identified and retrieved online and to inquire about any other available documents. Online contact included messages sent through posted forms and chats and to email addresses provided in the identified government websites. A random sample was used for telephone calls, which ultimately included the governments of Argentina, Bahamas, Barbados, Brazil, El Salvador, Colombia, Guatemala, Mexico, Paraguay, and Venezuela. Government representatives were also contacted directly during the Pan American Health Organization (PAHO) 50th Annual Directing Council Meeting, an annual event that brings together ministers of health and selected government representatives from all PAHO member states to discuss the health agenda for the region. Finally, PAHO country representatives were contacted by email to complete the verification of results.

Contextual variables

The selected socioeconomic indicators included those that 1) provided an overview of the economic, health, and technological context at the national level; 2) were available for the countries in the study; and 3) were published in reliable sources. Data were obtained from the Human Development Report 2011 (11), the World Health Statistics Report 2012 (12), and the International Telecommunications Union (ITU) Measuring the Information Society report for 2011 (13).

The variables included: total population (all usual residents of the country or all persons present in the country at the time of the census) (11); gross national income (GNI) per capita (an indicator of inequality), calculated in US\$ based on constant 2005 purchasing power parity (PPP) (11); total health expenditure (the sum of public and private health expenditure calculated as the percentage of a country's gross domestic product (GDP) and comprising all financial resources spent on the provision of health services, family planning activities, nutrition activities, and emergency aid designated for health, excluding water and sanitation) (14); and the ICT development index (IDI), a composite index made up of three sub-indices, including 11 indicators, which measures the extent

to which countries can use ICTs to enhance growth and development, based on available capabilities and skills required to make effective use of ICTs and enhance their impact (13).

Statistical analysis

Statistical analysis was carried out in SPSS 21.0 for Mac (IBM Corp, Armonk, New York, USA). Descriptive statistics were used to characterize the countries. To explore the influence of demographic and socioeconomic indicators on the existence of a national ICT or eHealth policy in LAC, binomial and multinomial logistic regressions were carried out. Data from the 33 countries in the study were included in the analysis. The dependent variable was the outcome of whether a country had a policy or not. Baseline covariate values were total population, GNI per capita, total health expenditure, and government expenditure on health. The appropriateness of the regression models was tested by performing a likelihood ratio test to determine model fit and the pseudo-coefficient of determination (R^2) to measure the model's predictive power. The Hosmer–Lemeshow test was also conducted to assess model reliability. Logistic regression was carried out because it is well suited for describing and testing hypotheses about relationships between a categorical dependent variable and one or more categorical or continuous explanatory variables (15). A P value < 0.05 was considered significant for all group comparisons.

While the IDI rank reported data for more countries in the LAC region compared to the Network Readiness Index (NRI), data were still missing for eight countries. Given the small sample size, the IDI rank was excluded from the logistic regression models.

RESULTS

Existing ICT and eHealth policies

The findings of the search effort suggest that 19 (57.6%) countries have national ICT policies and seven (21%) have national eHealth policies. Academic databases yielded 41 potentially eligible documents, which were reviewed in detail, but only four documents met the inclusion criteria. Of these, one made reference to an existing national ICT pol-

icy in Argentina, one each to an eHealth policy in Brazil and Chile, and the fourth mentioned the existence of a national program for the establishment of an information system in the health sector and the existence of a national strategy for an information society in Cuba, but did not directly provide information about a policy.

The Google search identified 19 eligible documents. Of these, 17 referred to a national ICT policy and two corresponded to a national eHealth policy (from Belize and Peru).

Contacting government representatives through government websites was not very helpful. The 31 countries that had an official government website were contacted via online forms, email, or chat, depending on the available feature. However, none of the submitted online forms resulted in a response, messages to 19 email addresses led to a partial response in most cases, and only the contact for the Peruvian government responded with a potentially eligible policy document.

Telephone contact also did not produce valuable results. In most cases, there was some difficulty in obtaining a response or identifying a person or department who was familiar with the topic and who could provide useful information. Only representatives from Brazil and Colombia were able to provide information leading to a potentially eligible document or about plans to develop new policies.

During PAHO's 50th Directive Council meeting, the Colombian representative affirmed the country had an ICT policy but did not corroborate the current development of an eHealth policy. The representatives from both Trinidad and Tobago and Venezuela said they were aware of ongoing work in the area of ICTs and policy in their country, but only the Trinidad and Tobago representative made any reference to a specific document. Both promised to send information upon their return, but none had been received by the end of 2013.

In contrast, of the 27 PAHO country representatives contacted, 19 (70.3%) responded. Although most of the responses did not vary from other forms of contact with governments, three additional national eHealth policies were identified (Cuba, Ecuador, and Mexico). Upon review of the eHealth policy of Ecuador, a national ICT policy

was identified for that country as well. Table 1 describes the final group of ICT and eHealth policies retrieved, and the sources where they were found.

Overview of country context

Table 2 summarizes the diversity in the LAC region with respect to demographic, social, economic, and technology context. The average population was 17.9 million, with the smallest being the population of the islands in the Caribbean and the largest the population of Brazil. Haiti had the lowest GNI per capita and Trinidad and Tobago had the highest. The average health expenditure was 7% of GDP, with St. Vincent and the Grenadines having the lowest value and Cuba the highest. Cuba also had the highest government expenditure on health, in contrast to Haiti, where only 21.8% of health expenses were paid by the government. In terms of ICT development, the best-ranked country was Uruguay at number 41 and the lowest was Nicaragua at 114 (out of 152 countries).

Logistic regression

For the logistic regression analysis, the hypothesis was that the likelihood that a country has an ICT or eHealth policy is related to its population, GNI per capita, total health expenditure, and/or government expenditure on health. The null hypothesis would imply no difference between the covariates and the existence of an ICT or eHealth policy.

The multinomial logistic regression model was created with four categories in the dependent variable: 1) no policy, 2) only an ICT policy, 3) only an eHealth policy, and 4) both policies. The binomial model only had two categories ("has policy" versus "does not have a policy") in the dependent variable and was conducted separately for ICT and eHealth policies. Absence of both an ICT and an eHealth policy was set as the reference group.

Table 3 shows the results from the multinomial logistic regression. The pseudo- R^2 (Cox–Snell = 0.580; Nagelkerke = 0.0650; McFadden = 0.390) and goodness of fit (Pearson $\chi^2 = 45.890$, $P = 1.000$; deviance $\chi^2 = 44.756$, $P = 1.000$) suggest that the fit of the model was good. While the model fitting rejected the hypothesis ($\chi^2 = 28.633$, $P = 0.004$), none of the vari-

TABLE 1. Information and communication technology (ICT) and eHealth^a policies in Latin America and the Caribbean, 2010

Country	ICT policy	eHealth policy
Antigua and Barbuda	Information and Communication Technologies (ICTs) Draft Policy Source: www.carib-is.net/node/92	Not found
Argentina	Plan Nacional de Gobierno Electrónico Decreto N° 378/2005 Source: www.sgp.gov.ar/contenidos/onti/productos/pnge/docs/pnge_decreto_378_2005.pdf or www.jgm.gov.ar/archivos/pme/pnge_decreto_378_2005.pdf	Not found
Bahamas	Not found	
Barbados	Barbados National ICT Strategic Plan Mobile Barbados: Building the Networked Nation Draft Report Source: www.commerce.gov.bb/Downloads/DRAFT_StrategicPlanFinalIV.pdf	Not found
Belize	Not found	Belize Health Information System (BHIS) Plan 2009–2011 Source: www.health.gov.bz/www/index.php/publications/national-health-information-system-strategic-plan
Bolivia	Estrategia Nacional de Tecnologías de Información y Comunicación para el Desarrollo (ETIC) Source: www.funredes.org/mistica/castellano/ciberoteca/participantes/docupart/ETIC_Proceso.pdf	Not found
Brazil	Estratégia Geral de Tecnologia da Informação—EGTI 2010 Source: www.governoeletronico.gov.br/sisp-conteudo/estrategia-geral-de-ti	Política Nacional de Informação e Informática em Saúde Proposta Versão 2.0 Source: www2.datasus.gov.br/DATASUS/APRESENTACAO/PoliticaInformacaoSaude29_03_2004.pdf
Chile	Estrategia Digital Chile 2007–2012 Source: www.agendadigital.cl/documento/estrategia-digital-chile-2007-2012	El Libro Azul—Agenda Digital del Ministerio Salud Source: www.itelemedicina.com/documentos/CHILE_libro_azul.pdf
Colombia	Plan Nacional de Tecnologías de la Información y las Comunicaciones (PLAN TIC) Source: www.colombiaplantic.org.co/medios/docs/PLAN_TIC_COLOMBIA.pdf	Not found
Costa Rica	Costa Rica: Verde e Inteligente Estrategia Nacional de Tecnologías de Información y Comunicación. Source: www.camtic.org/ES/estrategia_nacional_tic/estrategia_en_breve/	Not found
Cuba	Not found	Programa de Informatización del Sector de la Salud Source: www.di.sld.cu/estrategias/Programa%20de%20Informatizacion.pdf
Dominica	Government of Dominica [sic] Information Technology Strategic Plan April 18, 2005. Source: unstats.un.org/unsd/dnss/docViewer.aspx?docID=2241	Not found
Dominican Republic	Plan Estratégico E-Dominicana 2007–2010 Source: www.cnsic.org.do/documentos/task,doc_view/gid,104/	Not found
Ecuador	Agenda Nacional de Conectividad Source: www.conatel.gob.ec/site_conatel/index.php?option=com_content&view=category&layout=blog&id=38&Itemid=158	Política Nacional de Telemedicina/Telesalud—Propuesta Source: Document not public at the time—obtained through Ecuador's PAHO representative
El Salvador	Not found	
Grenada	ICT Strategy and Action Plan for Grenada 2001–2005 + ICT Strategy and Action Plan - Grenada (2006–2010) Source: www.carib-is.net/publications/grenada-ict-strategy-and-action-plan-2001-2005/ and www.carib-is.net/ictpolicias/information-and-communication-technology-ict-strategy-and-action-plan-grenada-2006%E2%80%902010	Not found
Guatemala	Not found	
Guyana	ICT4D National Strategy Guyana—Final Draft 2006 Source: www.ict4d.gov.gy/ictstrategy/ICT4D_Strategy_FinalDraft.pdf	Not found
Haiti	Not found	
Honduras	Not found	
Jamaica	Draft Master Implementation Plan for E-Powering Jamaica 2012 National ICT Strategy 2007–2012 Source: www.carib-is.net/content/draft-master-implementation-plan-e-powering-jamaica-2012-national-ict-strategy-2007-2012	Not found
Mexico	Vision Mexico 2020 + Sistema Nacional e-Mexico Source: www.cysp.com.mx/Ima/Amiti/Documentos/Descargables/Doc_PP_vision_Mexico_2020_resumen.pdf / and www.e-mexico.gob.mx/web/que-es-e-mexico/portal-e-mexico	Programa de Acción de Telesalud Source: www.cenetec.salud.gob.mx/descargas/comite_e-Salud/telesaludcomiteinterstitucional.pdf
Nicaragua	Not found	

(Continues)

TABLE 1. Continued

Country	ICT policy	eHealth policy
Panama	Not found	
Paraguay	Not found	
Peru	Plan de Desarrollo de la Sociedad de la Información en el Perú—La Agenda Digital Peruana Source: www.peru.gob.pe/AgendaDigitalPeru/pdf/CODESI%20-%20Presentacion.pdf	Plan Nacional de Telesalud Source: ftp://ftp2.minsa.gob.pe/otraspublicaciones/22/Telesalud.pdf
St. Kitts and Nevis	Government of St. Kitts and Nevis National Information and Communications Technology (ICT) Strategic Plan Source: unstats.un.org/unsd/dnss/docViewer.aspx?docID=2297	Not found
St. Lucia	Not found	
St. Vincent and the Grenadines	Not found	
Suriname	Not found	
Trinidad and Tobago	Fast forward: Trinidad and Tobago's National Information and Communication Technology Strategy Source: www.fastforward.tt/media_room/article.aspx?id=5549	Not found
Uruguay	Estrategia y agenda digital—Uruguay 2008–2010 Source: www.agesic.gub.uy/innovaportal/v/485/1/agesic/agenda_digital_uruguay_2008_-_2010.html?menuderecho=3	Not found
Venezuela	Not found	

^a The use of ICT for health.

TABLE 2. Descriptive statistics, Latin America and the Caribbean, 2010

Variable	Minimum	Maximum	Mean	Standard deviation
Population ^a	0.1	196.7	17.927	38.8347
GNI ^b per capita	1 123.0	23 439.0	9 324.121	5 371.1958
Health expenditure ^c	4.6	12.1	7.055	1.8009
Government expenditure ^d	21.8	92.7	56.482	14.5974
IDI ^e rank	41	114	79.40	21.430

^a In millions (11).

^b Gross national income (in US\$ based on constant 2005 purchasing power parity) (11).

^c Total expenditure on health as a percentage of 2009 gross domestic product (12).

^d General government expenditure on health as a percentage of 2009 total expenditure on health (12).

^e ICT Development Index (8).

TABLE 3. Multinomial logistic regression model for probability of information and communication technology (ICT) and eHealth^a policies, Latin America and the Caribbean, 2010

Policy	OR ^b	P	95% CI ^c
ICT and eHealth	Intercept ^d	0.174	
	Population	1.251	0.069
	GNI ^e per capita	1.000	0.770
	Health expenditure	1.393	0.495
	Government expenditure	0.979	0.673
ICT only	Intercept ^d	0.595	
	Population	1.191	0.147
	GNI per capita	1.000	0.177
	Health expenditure	0.619	0.115
	Government expenditure	1.009	0.795
eHealth only	Intercept ^d	0.999	
	Population ^f	1.000E-013	NA ^g
	GNI per capita ^f	0.928	0.987
	Health expenditure ^f	6534553338849464.000	0.998
	Government expenditure ^f	47.333	0.997

^a The use of ICT for health.

^b OR: odds ratio.

^c CI: confidence interval.

^d Reference: no ICT or eHealth policy.

^e GNI: gross national income.

^f Floating point overflow occurred while computing this statistic; therefore its value was set to "system missing."

^g NA: not applicable.

ables in the model showed statistical significance, although population showed a trend toward significance ($P = 0.069$).

Tables 4 and 5 summarize the results of the binary logistic regression for eHealth and ICT policies. The Hosmer–Lemeshow test evaluates whether a logistic regression model is well calibrated to help determine if the probability predictions generated by it reflect the occurrence of events in the data (16). The test does not estimate the extent of the fit. The results of the test for this study's models for eHealth policy and ICT policy ($\chi^2 = 9.598$, degrees of freedom = 8, $P = 0.294$, and $\chi^2 = 12.120$, degrees of freedom = 8, $P = 0.146$, respectively) suggest that both models fit the data well. However, despite the good fit of the data, none of the independent variables showed statistical significance.

DISCUSSION

This study showed that governments in LAC countries have begun to develop national ICT and eHealth policies. The results revealed that five countries had both policies, 14 had only an ICT policy, two countries had only an eHealth policy, and 12 countries did not appear to have any. The most useful methods for identifying the policies were 1) conducting a Google search and 2) consulting the PAHO country representatives. Searching traditional academic databases and

TABLE 4. Binary logistic regression model for eHealth^a policy, Latin America and the Caribbean, 2010

Step 1	OR ^b	P	95% CI ^c
Variables analyzed:			
Population	1.046	0.091	0.993–1.102
GNI ^d per capita	1.000	0.585	1.000–1.000
Health expenditure	1.359	0.308	0.754–2.452
Government expenditure	0.998	0.945	0.930–1.070
Constant	0.024	0.124	NA ^e

^a The use of information and communication technology (ICT) for health.

^b OR: odds ratio.

^c CI: confidence interval.

^d GNI: gross national income.

^e NA: not applicable.

TABLE 5. Binary logistic regression for information and communication technology (ICT) policy, Latin America and the Caribbean, 2010

Step 1	OR ^a	P	95% CI ^b
Variables analyzed:			
Population	1.236	0.090	0.967–1.581
GNI ^c per capita	1.000	0.153	1.000–1.000
Health expenditure	0.733	0.261	0.427–1.260
Government expenditure	1.009	0.789	0.947–1.074
Constant	1.11	0.962	NA ^d

^a OR: odds ratio.

^b CI: confidence interval.

^c GNI: gross national income.

^d NA: not applicable.

contacting government representatives did not yield a high number of eligible documents. Across countries a wide variability was found in 1) population, 2) GNI per capita, 3) expenditure on health, and 4) ICT development. The logistic regression models did not show significant statistical difference, although there seemed to be a trend for population.

Two organizations have started to keep track of ICT policies and eHealth policies in LAC. The Observatory for the Information Society in Latin America and the Caribbean (OSILAC) is a joint effort between the United Nations Economic Commission for Latin America (ECLAC) and the Institute for Connectivity in the Americas (ICA) at the International Development Research Centre (IDRC) to monitor and support the progress of regional countries toward the development of information societies (17). The Global Observatory for eHealth (GOe) is an initiative from the World Health Organization (WHO) that seeks to improve health by providing member states with strategic information and guidance on effective practices and standards in eHealth (18). More recently, the ITU started reporting

on the establishment of national ICT policies across UN member states (8). Contrasting the search yields with data from OSILAC and GOe suggested that the current study's effort led to an incomplete picture. OSILAC, for instance, reported that 26 LAC countries (79%) had ICT policies (19–21). Similarly, GOe reported in 2006 that 12 out of 14 LAC countries for which they obtained data had an ICT policy, adding eight additional countries in 2010 (out of 10 countries) (3, 22). While GOe made no reference to specific ICT policies that could be tracked, OSILAC's information suggested that documents from the Bahamas and Saint Lucia did not meet the inclusion criteria for this study. In addition, although there were some news or presentations on the Internet mentioning potentially eligible documents, this study was unable to find the reported policy for El Salvador, Nicaragua, and Panama mentioned by OSILAC.

The study search did not find the ICT policy for Cuba, Guatemala, Paraguay, or Venezuela reported by OSILAC. On the other hand, Internet reference to an ICT policy was found for Dominica and St. Kitts and Nevis, neither of which

was listed by OSILAC at the time of the study. The GOe published an updated report in 2012 (23), and this study's list of eHealth policies matched it, with the exception of Argentina, which did not meet this study's inclusion criteria.

The results of this study suggest that there may be a lack of awareness among government representatives with respect to the development and implementation of eHealth policies as well as, sometimes, ICT policies. Therefore, governments need to explore various ways to raise awareness about existing and planned eHealth policies, not only to facilitate ease of use and communication with their stakeholders, but also to promote collaborative international efforts.

According to Guerra & Jordan, the national policy environment relies heavily on the individual country's socioeconomic and political situation, which sets the priorities for government activities. Their study showed a correlation between levels of economic and digital development but noted that even where GNI levels were identical, some countries were making faster progress in the use of ICTs, which they said could be because those countries are more committed to and aware of the issue, giving it a place in the policy agenda and promoting actions geared toward digital development (19). An exploratory model was developed to assess some of the factors that could affect the development of an ICT or eHealth policy but it failed to identify any independent variables that showed a significant association. Further research is needed to better understand the influence of a country's context in the development and implementation of national ICT and eHealth policies.

As governments increasingly recognize that incorporating ICT is a priority for health systems development, collaboration between different sectors, both public and private, is central to achieving strategic and integrated action (1). The challenges posed by characteristics of the health system and factors associated with patients and their families will likely shape the transformative potential of ICTs in the region (24). A better understanding of the effect of economic variables on the role that ICTs play in health sector reform efforts (23, 25) will help shape the vision of what can be achieved, and the scope of activities and magnitude of investment required.

Limitations

The current results should be interpreted in light of various study limitations. First, given the strict inclusion criteria for ICT and eHealth policies, it is possible that documents for some countries did not meet the study criteria or exist in sources not used in the study and were thus excluded from the analysis. Second, the study did not differentiate between developed and adopted policies or consider policies being developed/tested (but not yet official). As a result, the authors may have 1) overestimated the extent/use of ICT/eHealth policy in countries with an eligible document that had not been adopted yet and/or 2) excluded countries that did not yet have an official policy but had made progress in the area of ICT/eHealth within their health sys-

tems. Finally, although the use of logistic regression is common in health research, the use of multinomial logistic regression is rare (15), which limits the comparisons that can be drawn from similar studies. Moreover, it is clear that many factors affect country context and thus it is likely that the variables in this study's models were not sufficiently comprehensive.

Conclusions

The countries in LAC have been making progress in envisioning the incorporation of ICT and eHealth policy within their health systems. However, partnerships at the national and regional level should be strongly encouraged to level the playing field for all countries in the region to assist them in advancing the equitable delivery of health services for their citizens. Fur-

ther studies are needed to investigate the association between the endogenous and exogenous factors that affect the ability of a country to generate, implement, and monitor ICT or eHealth policies.

Acknowledgments. The authors thank Laura O'Grady from the Centre for Global eHealth Innovation, for supporting the design of the review of the literature; Marina Englesakis from the University Health Network (UHN), for supporting the review of academic databases; Ana Lucia Ruggiero from the Pan American Health Organization (PAHO), for facilitating the contact with PAHO/WHO country representatives; and Adam Diamant from the University of Toronto, for supporting the statistical analysis.

Conflicts of interest. None.

REFERENCES

- International Telecommunication Union; World Health Organization. National eHealth Strategy Toolkit. Geneva: World Health Organization and ITU; 2012. Available from: www.itu.int/pub/D-STR-E_HEALTH.05-2012 Accessed on 7 May 2014.
- Chandrasekhar CP, Ghosh J. Information and communication technologies and health in low income countries: the potential and the constraints. *Bull World Health Organ.* 2001;79(9):850-5.
- World Health Organization Global Observatory for eHealth. Building foundations for eHealth—progress of Member States. Geneva: WHO; 2006. Available from: www.who.int/goe/publications/bf_FINAL.pdf Accessed on 7 May 2014.
- Canadian International Development Agency. CIDA's Strategy on Knowledge for Development through Information and Communication Technologies. Gatineau, Canada: CIDA; 2003. Available from: [http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUIImages/pdf/\\$file/ICT.pdf](http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUIImages/pdf/$file/ICT.pdf) Accessed on 7 May 2014.
- Khoja S, Durrani H, Parvez N, Fahim A. Scope of policy issues in eHealth: results from a structured literature review. *J Med Internet Res.* 2012;14(1):e34.
- United Nations Development Programme. Regional human development report for Latin America and the Caribbean 2010. Acting on the future: breaking the intergenerational transmission of inequality. San Jose, Costa Rica: UNDP; 2010. Available from: http://www.latinamerica.undp.org/content/rblac/en/home/library/human_development/human-development-report/ Accessed on 8 May 2014.
- Jenkins, W. Policy Analysis: a political and organizational perspective. New York: St. Martin's Press; 1978.
- International Telecommunications Union; United Nations Regional Commissions. Na-
- tional e-strategies for development: global status and perspectives 2010. Geneva: ITU; 2011. Available from: www.itu.int/ITU-D/cyb/estrat/estrat2010.html Accessed on 7 May 2014.
- Mars M, Scott RE. Global e-Health policy: a work in progress. *Health Aff (Millwood).* 2010;29(2):237-43.
- Scott RE, Chowdhury MF, Varghese S. Telehealth policy: looking for global complementarity. *J Telemed Telecare.* 2002;8 Suppl 3:55-7.
- United Nations Development Programme. Human development report 2011. Sustainability and equity: a better future for all. New York: United Nations; 2011. Available from: <http://hdr.undp.org/en/content/human-development-report-2011> Accessed on 8 May 2014.
- World Health Organization. World health statistics report. Part III: global health indicators. Geneva: WHO; 2012. Available from: http://www.who.int/healthinfo/EN_WHS2012_Part3.pdf?ua=1 Accessed on 8 May 2014.
- International Telecommunications Union. Measuring the information society. Geneva: ITU; 2011. Available from: http://www.itu.int/ITU-D/ict/publications/idi/material/2011/MIS_2011_without_annex_5.pdf Accessed on 8 May 2014.
- World Bank. Health expenditure, total (% of GDP) [database on the Internet]. Washington: World Bank; c2011. Available from: <http://data.worldbank.org/indicator/SH.XPD.TOTL.ZS> Accessed on 7 May 2014.
- Joanne Peng CY, Nichols RN. Using multinomial logistic models to predict adolescent behavioral risk. *J Mod App Stat Meth.* 2003;2(1):177-88.
- LaValley MP. Statistical primer for cardiovascular research. *Circulation.* 2008;117:2395-9.
- United Nations Economic Commission for Latin America. About ECLAC [Internet]. Santiago: UN; c2013. Available from: <http://www.eclac.org/cgi-bin/getprod.asp?xml=/noticias/paginas/4/43024/P43024.xml&xsl=/tpl-i/pl18f-st.xsl&base=/tpl-i/top-bottom.xsl> Accessed on 7 May 2014.
- World Health Organization. Global Observatory for eHealth (GOe) [homepage on the Internet]. Geneva: WHO; c2014. Available from: www.who.int/goe/en/ Accessed on 7 May 2014.
- Guerra M, Jordan V. Public policies for the information society: a shared vision? Project document. Santiago: United Nations; 2010. Available from: www.eclac.org/ddpe/publicaciones/xml/6/39176/W314Eng.pdf Accessed on 8 May 2014.
- Peres W, Hilbert M. La sociedad de la información en América Latina y el Caribe: desarrollo de las tecnologías y tecnologías para el desarrollo. Santiago: United Nations; 2009. Available from: <http://www.eclac.cl/cgi-bin/getProd.asp?xml=/publicaciones/xml/2/36002/P36002.xml&xsl=/ddpe/tpl/p9f.xsl&base=/dmaah/tpl/top-bottom.xsl> Accessed on 8 May 2014.
- Observatory for the Information Society in Latin America and the Caribbean. Monitoring eLAC2007: progress and current state of development of Latin American and Caribbean information societies. Santiago: United Nations; 2007. Available from: http://unctad.org/Sections/dite_dir/docs/dite_pccb_stddev0125_en.pdf Accessed on 8 May 2014.
- Global Observatory for eHealth. Atlas—eHealth country profiles based on the findings of the second global survey on eHealth. Geneva: World Health Organization; 2010. Available from: http://www.who.int/goe/publications/ehealth_series_vol1/en/index.html Accessed on 7 May 2014.

23. World Health Organization. The bigger picture for e-health. Bull World Health Organ. 2012;90(5):330-1.
24. Fernandez A, Oviedo E. Salud electrónica en América Latina y el Caribe: avances y desafíos. Santiago: United Nations and European Union; 2010. Available from: www.eclac.org/publicaciones/xml/5/41825/di-salud-electronica-LAC.pdf Accessed on 7 May 2014.
25. Katz J, Hilbert M. Road maps towards an information society in Latin America and the Caribbean. Santiago: United Nations; 2003. Available from: www.eclac.org/publicaciones/xml/0/12900/RoadMaps.pdf Accessed on 8 May 2014.

Manuscript received on 15 July 2013. Revised version accepted for publication on 12 May 2014.

RESUMEN

Política en materia de eSalud y tecnologías de la información y la comunicación en América Latina y el Caribe: análisis de las políticas nacionales y evaluación del contexto socioeconómico

Objetivo. Analizar la disponibilidad de políticas nacionales en materia de tecnologías de la información y la comunicación (TIC) o eSalud formuladas por los países de América Latina y el Caribe, y determinar la influencia del contexto socioeconómico del país sobre la existencia de este tipo de políticas.

Métodos. Se seleccionaron documentos que describieran una política nacional de TIC o eSalud en cualquiera de los 33 países de América Latina y el Caribe según la clasificación de las Naciones Unidas, a partir de tres fuentes de datos: bases de datos académicas; el motor de búsqueda Google; y organismos y representaciones gubernamentales. También se investigó la relación entre la existencia de una política de este tipo y los indicadores socioeconómicos nacionales.

Resultados. Se ha producido algún progreso en el establecimiento de políticas de TIC y eSalud en América Latina y el Caribe. Los métodos más útiles para determinar las políticas fueron: 1) el uso del motor de búsqueda Google, y 2) el contacto con las representaciones de la Organización Panamericana de la Salud (OPS) en los países. Parece más probable que los países que han elaborado una política nacional de TIC hayan implantado también una política nacional de eSalud. No se observó ninguna asociación estadísticamente significativa entre la existencia de una política y el contexto socioeconómico de un país.

Conclusiones. Es preciso que los gobiernos intensifiquen las iniciativas para concientizar acerca de las políticas existentes y planificadas en materia de TIC y eSalud, no solo para facilitar su utilización y la comunicación con los interesados directos, sino también para promover iniciativas colaborativas a escala internacional. Por otra parte, una mejor comprensión del efecto de las variables económicas sobre la función que las TIC desempeñan en las iniciativas de reforma del sector de la salud ayudará a establecer la perspectiva de lo que se puede llegar a lograr.

Palabras clave

Política de salud; tecnología de la información; América Latina; región del Caribe.