USAID
FROM THE AMERICAN PEOPLE

The Peru Continuous DHS Experience

DHS OCCASIONAL PAPER NO. 8

SEPTEMBER 2014

This publication was produced for review by the United States Agency for International Development (USAID).
The report was prepared by Shea O. Rutstein and Ann Way of ICF International, Rockville, MD, USA.

DHS Occasional Papers No. 8

The Peru Continuous DHS Experience

Shea O. Rutstein

Ann Way

ICF International

Rockville, Maryland, USA

September 2014

Corresponding author: Shea O. Rutstein, Demographic and Health Research Division, ICF International, 530 Gaither Road, Suite 500, Rockville, Maryland, USA; phone: 301-572-0950; fax: 301-407-6501; Email: Shea.Rutstein@icfi.com

Acknowledgment: Many people contributed to the success of the Peru Continuous DHS: the staff of the Population Health and Nutrition Office at the USAID Mission in Lima, especially Richard Martin, Luis Seminario, and Erik Janowski and their staff; the directors of the National Institute of Statistics and Informatics of Peru, Gilberto Moncada, Farid Matuk, Cherly Ore, Renan Quispe, Anibal Sanchez, and Alejandro Vilchez; survey directors Rosario Cespedes, Jorge Reyes, and Arturo Arias; heads of the Bureaus for Censuses and Surveys and Demography and Social Indicators, Gaspar Moran, Gloria Loza, and Rofilia Ramirez; the Peru DHS staff and other INEI staff who have contributed very substantially to the program, as well as staff of the Ministry of Health, Ministry of the Economy, Ministry of Women and Vulnerable Populations (formerly Ministry of Women and Social Development), Programa Juntos, and many other Peruvian government institutions and Peruvian NGOs. At ICF International, several staff members also contributed to the success of the Peru Continuous DHS: Alfredo Aliaga and Guillermo Rojas, in particular, as well as a consultant, Luz Marina Garzon.

We would also like to acknowledge the contributions that Mahmoud Elkasabi and Bridgette Wellington made to the preparation of this report.

Editor: Kerry L.D. MacQuarrie
Document Production: Yuan Cheng

This study was carried out with support provided by the United States Agency for International Development (USAID) through The DHS Program (#GPO–C–00–08–00008–00). The views expressed are those of the author and do not necessarily reflect the views of USAID or the United States Government.

The DHS Program assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. For additional information about the DHS Program contact: DHS Program, ICF International, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA; phone: 301-407-6500, fax: 301-407-6501, email: reports@dhsprogram.com, Internet: www.dhsprogram.com.

Recommended citation:

Rutstein, Shea O., and Ann Way. 2014. *The Peru Continuous DHS Experience.* DHS Occasional Papers No. 8. Rockville, Maryland, USA: ICF International.

Contents

Tables v

Abstract vii

Executive Summary ix

1. Introduction 1

2. Background 3

3. Peru Continuous DHS: Design and Implementation 5

3.1. Sample 8

3.2. Survey Contents 11

3.3. Staffing 12

3.4. Timetable 14

3.5. Fieldwork Organization and Implementation 14

3.6. Data Processing 15

3.7. Data Dissemination 16

4. Key Continuous DHS Survey Goals and the Peru Experience 19

4.1. Strengthening Host Country Capacity to Conduct the DHS 19

4.2. Creating an Informed Stakeholder Base 20

4.3. Implementing the CS within the Same Cost Parameters as a Standard DHS 21

4.4. Utility of CS Data for Tracking Trends and Short-term Changes 21

5. Lessons Learned from the Peru CS for Other Countries 23

References 25

Appendix 29

Tables

Table 1. Basic survey characteristics, Peru DHS 2000 and Peru Continuous Survey (CS) cycles 2004-2014 6

Table 2. Representation in the 2004-2007 Peru Continuous Survey (CS) cycles 9

Appendix Table 1. Sampling errors for selected indicators in the 2009-2012 Peru Continuous Survey (CS), by urban-rural residence and department 29

Appendix Table 2. Result of tests of significance of differences between the 2009-2012 Peru Continuous Survey (CS) cycles for selected indicators, by urban-rural residence and department 35

Abstract

Peru was the first country to undertake a continuous survey (CS) within The Demographic and Health Survey (DHS) Program. The continuous DHS replaces a standard DHS conducted at the typical five-year interval with a continuous survey operation in which DHS data is collected and reported on annually by a permanently maintained DHS office and field staff. This paper considers the rationale for continuous DHS surveys, reviews key elements in the initial Peru CS survey design, and describes how the Peru CS evolved over time, particularly in response to demands for subnational data. In reviewing the Peru experience, the paper also identifies some strengths and weaknesses of the CS model and highlights factors that were crucial in enabling Peru to successfully implement a continuous DHS for more than a decade.

Executive Summary

Peru was the first country to undertake a continuous survey (CS) within The Demographic and Health Survey (DHS) Program. This paper considers the rationale for continuous DHS surveys, reviews key elements in the initial Peru CS survey design, and describes how the Peru CS evolved over time, particularly in response to demands for subnational data. In reviewing the Peru CS experience, the paper also identifies some strengths and weaknesses of the CS model and highlights factors that were crucial in enabling Peru to successfully implement a continuous DHS for more than a decade.

As originally conceived, the continuous DHS would replace a standard DHS conducted at the typical five-year interval with a continuous survey operation in which DHS data would be collected and reported on annually by a permanently maintained DHS office and field staff. The sample would be based on the sample for the most recent standard DHS and would be designed in such fashion that each annual CS cycle would involve a sample roughly one-fifth of the size of a standard DHS sample. The sample was expected to provide estimates at the national level and separately for urban and rural areas and large regional units. For estimates for smaller administrative units (e.g., provinces), however, data would typically need to be pooled over several cycles. Five cycles of the CS were expected to cost about the same as one standard DHS survey.

The idea of a continuous Demographic and Health Survey responded to two expressed needs of host countries and donors. The first was the increasing demand to have data available more frequently than the typical five-year interval between standard DHS surveys in order to more effectively monitor progress in population and health programs. The second was the desire to ‘institutionalize’ the capacity to conduct DHS surveys. While substantial capacity building activities were built into DHS surveys, the episodic nature of standard DHS surveys meant that there was often limited carryover of trained staff and infrastructure from one DHS survey to the next. The design of a continuous DHS was thought to resolve both of these problems. Other potential benefits of the CS were expected to include improved data quality due to the retention of trained field staff across multiple cycles and the ability to more closely supervise the performance of the smaller teams that would be employed in the CS compared to a standard DHS. It was also expected that country governments and donors would find it easier to fund a continuous DHS since the costs would be stretched over five years and, thus, would be lower and more predictable than in a standard DHS.

The first cycles of the Peru Continuous DHS conducted during the period 2004-2008 conformed to key elements of the original CS design. Fieldwork was implemented during 9-10 months of each year (cycle) by small regionally based teams of three to four members each. For each cycle, the sample was based on a random sub-selection of clusters from the last standard Peru DHS conducted in 2000. A household listing was carried out in the clusters selected for a cycle prior to the fieldwork. After the initial 2004 cycle, data was pooled to allow for reporting results for Peru’s 24 departments. Beginning with the fifth cycle in 2008, the government of Peru decided to expand the CS sample substantially in order to have enough cases in each of Peru’s 24 departments to provide estimates of key population and health indicators without pooling data from previous cycles. The decision to expand the survey sample responded to annual reporting requirements for health programs within Peru’s budgeting-by-results framework. In the 2015 cycle, the sample for the Peru CS will exceed 35,000 households, which is around six times the size of the sample in the initial cycle of the CS in 2004.

The Peru CS experience clearly validates the viability of the continuous DHS survey concept. Most of the initial objectives for the continuous DHS have been achieved in Peru. The CS has been institutionalized, with the Government of Peru funding all survey operations. A DHS unit was established within the Instituto Nacional de Estadistica e Informatica (INEI), the government’s national statistical agency,

beginning with the first CS cycle in 2004. Currently the unit's field staff are permanent INEI employees, and the unit is operating without external technical support. Staff retention and morale are high within the unit. Both the Peruvian legislative and executive branches rely upon the data generated by the CS, which are integral to the process of determining the health program budgets for Peru's 24 departments.

This review of the Peru CS experience identifies some challenges of the continuous DHS model. While the Peru CS data are widely used, there is need to devote more resources to improve the understanding and use of the data at the department level and to promote and support more in-depth analyses of the results. The Peru CS experience also highlights the statistical limitations of efforts to use surveys to generate annual estimates. In most settings, pooling of data from multiple cycles will be required to reliably detect short-term trends for many indicators, particularly at subnational levels. This reduces to some degree the utility of a continuous DHS in addressing the demand for annual data. Where the demand for annual data is particularly strong as in Peru's budgeting-by-results framework, it can also lead to substantial expansion in the CS sample size and, thus, increased costs.

Finally, a number of factors are identified that were critical to the success of the Peru CS including the capacity of the implementing agency at the initiation of the CS; strong stakeholder demand for and capacity to utilize annual data; attention to the design of the CS sample; the establishment of a permanent CS unit within the implementing agency; and reliable yearly funding. The Peru experience also points to the impact that accommodating demands for subnational data may have on a CS and the importance of taking that factor into account early in the process of making a decision about a continuous DHS survey design.

1. Introduction

As initially proposed (Rutstein 1995; Rutstein 2002), the basic objective of a continuous Demographic and Health Survey (DHS) was to produce information on a regular basis (annually or semiannually) using a permanently maintained DHS office and staff. Peru was the first country to undertake a continuous survey (CS) within The DHS Program. A second experiment with the continuous survey format for DHS surveys has recently been launched in Senegal. The Senegal CS includes both a continuous population-based DHS and a continuous Service Provision Assessment (SPA) or health facility component (ANSD and ICF International 2012a; ANSD and ICF International 2012b).

This paper first explores the rationale for a continuous DHS survey and highlights some of the challenges that may be faced in setting up a continuous DHS. The paper then reviews the history of the CS in Peru, from the planning phase for the first cycle in 2004 through the implementation of the eleventh round in 2014. It describes key aspects of the original design for the CS and highlights how the survey evolved in response to the demand for subnational data from its principal stakeholders.

The discussion is intended to offer guidance to other countries interested in a continuous DHS about the aspects of the Peru CS structure which capitalized on strengths of the CS design and avoided some of its potential pitfalls. It also highlights the fact that much of the success of the Peru CS lay in the way the survey has been adapted over time to respond to evolving data needs. The paper concludes by summarizing the lessons that the Peru CS experience offers for other countries that are interested in undertaking a continuous DHS survey.

2. Background

One of the key factors generating interest in a continuous DHS was the demand in many countries for information on a more frequent basis than that provided by the typical five-year DHS cycle. Interim DHS surveys had been implemented in several countries to address this demand. While the original goal was for interim DHS surveys to be a quicker, more targeted and, thus, cheaper version of the DHS, the desire for information at sub-national levels and for new areas of concern often resulted in interim surveys nearly as costly and complex as regular DHS surveys. A "permanent" or continuous DHS survey was seen as potentially a more cost-effective approach than fielding two full-scale DHS surveys or combinations of full-scale and interim DHS surveys. Even if the five-year cost of the continuous survey was about the same as the two DHS surveys or one DHS and one interim survey, a continuous DHS survey would provide annual national estimates and subnational estimates on a two to three year basis (for every year after the third annual cycle has been completed), which was not feasible in the standard DHS approach. The continuous DHS survey also was seen as easier to fund as the annual cost would be low in comparison to the cost of a standard DHS and, thus, both host countries and donors would more readily allocate funds for a CS in annual budgets.

The proposal also offered the CS as a potential solution to what is recognized as a major barrier to institutionalization of DHS surveys: the need for training and retraining of the local staff in countries with repeated DHS surveys. The need for repeating training is mainly due to the episodic nature of the DHS surveys, which are typically implemented at five-year intervals. At the beginning of each DHS, implementing organizations temporarily assign staff to direct and support the DHS. Once the DHS fieldwork finishes, the data entry is completed, and the final report is published, these staff members go on to other assignments. This reassignment not only affects their availability to work on the next DHS but has an immediate downside in that the individuals most knowledgeable about the current round of the DHS are not available to support additional tabulation requests or respond to other DHS stakeholder data needs. Moreover, in addition to the loss of experienced staff, the office space, office equipment and furniture, computers and specialized equipment (such as height boards, scales, and Hemocues) used for the DHS are reassigned to other activities or are given out to other agencies. As a result, much of the capacity and infrastructure built during the implementation of the DHS may be lost by the time the next round is launched.

The continuous survey proposal also cited several other potential advantages of a CS over the standard DHS approach. Both the headquarters and field staff would have permanent positions, which would foster the building and retention of skills. It was also assumed that that the CS would result in improved data quality, at least in part because permanently employed staff would have a greater stake in conforming to performance standards than temporary staff. Other factors assumed to support improved data quality included the longer implementation cycle for the CS, which would allow errors to be identified and corrected before too many interviews were conducted. Also, there would be relatively few field teams in the CS compared with a standard DHS and, thus, supervision on a regular basis would be easier.

Continuous DHS Survey

Anticipated Advantages

- *Institutionalization*
- *Flexibility in design*
- *Easier budgeting*
- *Frequent information*
- *Better data quality*

Potential Challenges

- *Integration within organization*
- *Consistency in funding flows*
- *Increased complexity*
- *Risk of field staff fatigue*
- *Some data needs not easily met*

Finally, the CS was seen as holding the promise of better meeting user needs for information not only by providing from the beginning annual estimates at the national, urban-rural, and regional levels but also by expanding the subnational administrative units for which estimates could be generated by pooling data from CS cycles. Moreover, the CS design was considered to offer greater flexibility in meeting the demands of users for special information than the standard DHS, which often quickly becomes overloaded in responding to multiple stakeholder needs. Questionnaire modules could be added and deleted from cycle to cycle in a CS. It also would be possible to adjust the sampling in a CS cycle to oversample populations of special interest to stakeholders.

The original CS proposal outlined the many potential advantages of the CS design. However, it is recognized there may be some challenges in setting up a CS. In settings where technical staff and other infrastructure resources (IT, transport, etc.) are already stretched thin, implementing agencies may not be able to set up a unit devoted solely or almost solely to the CS, even if funding is available. The CS unit also would need to be integrated into the broader organizational structure of the implementing agency. This may require a careful balancing of the need for some independence of operations for the CS unit with the need to ensure the CS unit has the technical, administrative, and financial support required to successfully function. Moreover, while the funding burden for the CS in any one year would be substantially below that required for a standard DHS, obtaining a steady flow of funds from government and/or donors to ensure the smooth implementation of each CS cycle may not be easy in many settings. In addition, the initial costs of setting up the CS infrastructure may require more funds than conducting a single interim survey, for example, if the transportation infrastructure is weak and vehicles must be purchased.

The CS design also is necessarily more complex than that of a standard DHS survey, with increased technical demands especially at the sampling and analysis phases. The development of the CS sample design has to balance the demand for timely, reliable estimates at national and subnational levels for diverse indicators with the available funding. The design must also take into account how the sample will be updated at appropriate intervals.

At the analysis phase, some indicators can be calculated with adequate precision only by combining data from multiple cycles, particularly at the subnational levels. This requirement would need to be taken into account both in developing the CS analysis plans and in materials used to inform the consumers of the CS about appropriate approaches to the use of the data. Implementing organizations lacking the expertise to support the more complex sampling and analytic tasks may have to rely on greater external technical assistance than even in a standard DHS, at least in the short run.

With respect to data quality, while the potential advantages of a CS are clear, there are aspects of a CS that may, in practice, negate these advantages particularly over time. These include the repetitive nature of DHS interviews and the often difficult field conditions field staff may encounter on a regular basis. The design flexibility of the CS also is not limitless and there may be data demands that may not be easily met without major modifications to the basic CS design. For example, strong seasonality of malaria in some African countries may require significant adjustments to the length of fieldwork and the number of survey teams each year if malaria testing is to be done during the high transmission period. This may present a significant challenge to maintaining a permanent field staff.

3. Peru Continuous DHS: Design and Implementation

The Peru CS is currently in its eleventh cycle. Table 1 summarizes information on basic survey parameters for each of the 11 CS cycles and, for comparative purposes, for the 2000 Peru standard DHS. As can be seen in Table 1, the household samples, which initially averaged around 7,000 households in the early cycles of the Peru CS, were considerably expanded beginning with the 2008 cycle. The expansion took place in response to stakeholder demand for data for tracking new nutrition programs; the latter programs focused on the country's 24 departments reflecting the decentralization strategy Peru adopted in 2002 (Calvo-Gonzalez 2010).

This section of the paper looks at how key aspects of the Peru CS including the sample, survey content, staffing, fieldwork, and results reporting were initially designed and how they evolved over the 11 years the survey has been conducted. The discussion is organized around the following distinct phases in the evolution of the Peru CS: (1) the initial design and implementation during the period 2004-2008 and (2) the period from 2009 onwards when the survey focus shifted to providing department-level results annually.

Table 1. Basic survey characteristics, Peru DHS 2000 and Peru Continuous Survey (CS) cycles 2004-2014

Year/ Type of DHS	Sample frame*	Number of sample clusters	Number of households**	Number of women age 15-49**	Domain for which data reported***	Data collection modality (CAPI/paper questionnaire)	Biomarker data	Special modules
2014 Continuous	2007 census with stratification for wealth quintiles in large urban areas****	1,426	Currently in field	Currently in field	National, Urban/Rural, Department	CAPI	Anthropometry, anemia, Blood pressure, Chlorine, Pilot test of A1c diabetes	Chronic disease and trauma, Shortened environmental health, Domestic violence, Maternal mortality, Child labor, Early childhood education
2013 Continuous		1,426	26,853	22,920	National, Urban/Rural, Department	CAPI	Anthropometry, Anemia, Blood pressure, Chlorine	Chronic disease and trauma, Shortened environmental health, Domestic violence, Maternal mortality, Child labor, Early childhood education
2012 Continuous		1,426	27,218	23,888	National, Region, Department	CAPI	Anthropometry, Anemia, Blood pressure, Chlorine	Chronic disease and trauma, Shortened environmental health, Domestic violence, Maternal mortality, Child labor, Early childhood education
2011 Continuous	2007 census****	1,132	26,528	22,517	National, Urban/Rural, Department	CAPI	Anthropometry, Anemia, Blood pressure, Chlorine	Chronic disease and trauma, Shortened environmental health, Domestic violence, Maternal mortality, Child labor, Early childhood education
2010 Continuous	2007 census****	1,132	26,605	22,947	National, Urban/Rural, Department	CAPI	Anthropometry, Anemia, Blood pressure, Chlorine, Pilot test of e. coli in drinking water	Chronic disease and trauma, Shortened environmental, Domestic violence, Maternal mortality, Child labor, Early childhood education
2009 Continuous	2007 census	1,132	26,834	24,212	National, Urban/Rural, Department	CAPI	Anthropometry, Anemia, Chlorine	Shortened environmental health module, Domestic violence, Maternal mortality, Child labor, Early childhood education
2008 Continuous	Combined sampling frames: 1/5 of 2000 DHS clusters + 2005 census; Expansion for baseline of budgeting by results program	720	18,445	16,159	National, Urban/ Rural Department based on merged data from 2007-2008 cycles	CAPI	Anthropometry, Anemia, Chlorine	Shortened environmental health, Domestic violence, Maternal mortality

(Continued...)

Table 1. – *Continued*

Year/ Type of DHS	Sample frame*	Number of sample clusters	Number of households**	Number of women age 15-49**	Domain for which data reported***	Data collection modality (CAPI/paper questionnaire)	Biomarker data	Special modules
2007 Continuous	1/5 of 2000 DHS clusters*****	281	7,188	6,399	National, Urban/ Rural	CAPI	Anthropometry, Anemia	Ethnicity module, Shortened environmental health, Domestic violence, Maternal mortality
2006 Continuous	1/5 of 2000 DHS clusters*****	283	7,226	6,625	National, Urban/ Rural Department based on merged data from 2004-2006 cycles	Paper Pilot test of PDA CAPI		Full environmental health, Domestic violence, Maternal mortality
2005 Continuous	1/5 of 2000 DHS clusters*****	284	6,837	6,214	National, Urban/ Rural	Paper	Anthropometry, Anemia	Domestic violence, Maternal mortality
2004 Continuous	1/5 of 2000 DHS 2000 clusters*****	283	6,377	6,251	National, Urban/ Rural	Paper		Domestic violence, Maternal mortality
2000 Standard	1999 precensus	1,414	28,900	27,843	National, Urban/ Rural	Paper	Anthropometry, Anemia, Chlorine	

CAPI – Computer-assisted personal interviewing

* For each cycle of the Continuous Survey, the samples covered during the first and second halves of fieldwork were nationally representative.

** Completed interviews

*** For a list of the national reports, see References.

**** Half the clusters are the same as the preceding year to reduce variance when assessing trends.

***** Clusters are the same as in the 2000 DHS to reduce variance when assessing trends.

3.1. Sample

3.1.1. Initial sample design and implementation for the 2004-2008 cycles

Several objectives guided the development of the initial Peru CS sample design. One of the key factors was a concern to maximize the utility of the sample for monitoring trends. In this regard, the initial design for the Peru CS called for the sample to be drawn from the same clusters that were included in the Peru 2000 DHS. The reuse of the clusters would greatly reduce the sampling variance across cycles and, thus, improve the precision of estimates of trends compared with two separate (independent) selections of clusters. Moreover, there was a substantial cost saving since boundary maps of the clusters were already available.

The frame of the 2000 Peru DHS sample was based on the 1991 census for rural areas and the 1999 pre-census work done for the 2000 census for urban areas (which was not carried out until 2005). In the Peru 2000 DHS sample, each of the country's 24 departments was a separate domain. Approximately fifty clusters were selected for the 2000 DHS in each department except the department of Lima (which incorporates metropolitan Lima), where more than 200 clusters were selected. The 2000 DHS sampled approximately 20 households per cluster, resulting in a sample of about 1,000 households per department, again with the exception of Lima, where more than four times the households were selected compared with the other departments.

The Peru CS sample design called for one-fifth of the clusters to be selected from the 2000 Peru DHS clusters per department per cycle (year) of the CS, except in Lima for which a larger number of clusters were again selected. The clusters were to be selected in such fashion that they would allow for national results to be reported every four months (trimester). As in the 2000 Peru DHS, the sample take was set at 20 households per cluster. Thus, each cycle of the Peru CS was to cover about 6,000 households annually.

This approach was intended to allow for changes in national indicators to be tracked every trimester and for the production of semiannual reports. However, sampling error calculations showed that the number of interviews completed during each four-month round of fieldwork generally would be too small to produce reliable estimates, even at the national level. Thus, it was decided that there would be two rounds per cycle, with fieldwork in each round lasting five months. Each round would involve a nationally representative sample.

Table 2 shows the level of representation the CS was originally designed to achieve for selected indicators. Reliable estimates could be reported for some key indicators and at subnational levels for most indicators, particularly at the department level, only by combining two to three years of data.

Table 2. Representation in the 2004-2007 Peru Continuous Survey (CS) cycles

	Levels			
DHS indicators	**National**	**Urban-rural**	**Regional**	**State**
Population structure				
Urban-rural distribution	annually	na	annually	2 years
Age structure	annually	annually	annually	2 years
Household structure	annually	annually	annually	2 years
Education	annually	annually	2 years	5 years
Fertility				
Total and age-specific fertility rates	annually	annually	annually	2 years
Crude birth rate	annually	annually	annually	2 years
Age at first birth	annually	annually	annually	2 years
Contraception				
Contraceptive prevalence rate	annually	annually	annually	2 years
Method distribution	annually	annually	annually	2 years
Unmet need	annually	annually	annually	2 years
Continuation rate	annually	annually	annually	3 years
Fertility desires				
Ideal family size	annually	annually	annually	2 years
Desire to limit	annually	annually	annually	2 years
Desire to space	annually	annually	annually	2 years
Mortality				
Child mortality rates	annually	annually	2 years	5 years
High risk	annually	annually	annually	annually
Maternal mortality*	5-10 years	na	na	na
Adult mortality*	5 years	na	na	na
Maternal health				
Prenatal care				
Professional	annually	annually	annually	2 years
Number of visits	annually	annually	annually	2 years
Delivery assistance				
Professional	annually	annually	annually	2 years
In a health facility	annually	annually	annually	2 years
Child health				
Vaccination rates	annually	annually	2 years	5 years
Morbidity				
Prevalence	annually	annually	annually	2 years
Treatment	annually	annually	4 years	5 years
Nutrition				
Breastfeeding				
Initial	annually	annually	annually	2 years
Exclusive < 6 months	annually	annually	3 years	5 years
Solids 6-9 months	annually	annually	3 years	5 years
Median duration	2 years	2 years	3 years	5 years
Complementary foods	2 years	2 years	2 years	2 years

(Continued...)

Table 2. – *Continued*

DHS indicators	Levels			
	National	**Urban-rural**	**Regional**	**State**
Anthropometry	2 years	2 years	4 years	4 years
Anemia status	2 years	2 years	4 years	4 years
Women's status	annually	annually	annually	2 years
Domestic violence	annually	annually	annually	2 years
HIV/AIDS				
Knowledge of HIV/AIDS	annually	annually	annually	2 years
Knowledge of prevention	annually	annually	annually	2 years
Use of preventive measures	annually	annually	annually	2 years
Stigma and discrimination	annually	annually	annually	2 years
Knowledge of sexually transmitted infections (STIs)	annually	annually	annually	2 years
Prevalence of STIs	annually	annually	annually	2 years
Treatment of STIs	3 years	3 years	4 years	5 years

na = not applicable

*Adult and maternal mortality are based on reports on siblings of respondents and typically do not have the questions necessary to obtain sub-national estimates.

The CS design also had to allow for the sample to be adjusted for population growth and migration, non-response, and any variability in the sub-samples. To account for population change, a complete household listing prior to each cycle was built into the design. Because data from annual cycles would have to be pooled together to provide some estimates, consideration was also given to how households should be selected from the list in each cluster for the survey. There were two alternative approaches. The first was to take a fixed number of households in each cluster; this would have required adjusting the weight for the cluster by the relative change in the number of households compared with those found in the cluster at the time of the 2000 DHS. A second alternative, which was adopted, was to vary the number of households selected to be interviewed proportionately with the change in the total number of cluster households compared with the total number found in the 2000 DHS listings. For example, if at the time of the 2000 survey there were 300 households in a cluster and prior to the fieldwork for a cycle of the CS, it was found that there are now 360 households, the sample take was adjusted by 360/300 or 1.2. The second alternative maintained the basic weight of the cluster as it was in the 2000 DHS.

The design for the CS also called for the non-response rates to be calculated for each cycle. In addition, the CS design involved a post-stratification scheme to further control variability of the sub-samples. Adjustment factors were calculated for each cycle to bring the urban-rural and natural region distribution of the sub-selection of clusters in line with that of the whole set of clusters. This adjustment was done using the distribution of households from the 2000 Peru DHS survey, both for the sub-selected clusters and the entire five-year set of clusters. This procedure allowed the real changes in the urban-rural and natural region distributions to be incorporated while reducing the sampling errors for trends.

In summary, the initial CS sample design called for the data for each cycle to be weighted with reference only to the clusters and response rates of that cycle. This procedure was important because it allowed representative results irrespective of which cycles were pooled together. Had the weights been normalized over the total data file as is the standard DHS procedure, the different 'pools' of data would not be representative.

3.1.2. Sample design 2009-2014

When the decision was made to expand the sample to provide department-level data annually, a new sample design was developed for the Peru CS. Thus, from the 2009 cycle onwards, the CS sampling frame was based on enumeration areas from the 2007 population census.[1] Beginning with the 2009 cycle, the CS sample was selected annually in two stages and was representative in each of the two halves—semesters—of each cycle (year). The first sampling stage consisted of clusters (census enumeration areas), and the second consisted of dwellings within each of the selected clusters. The domains of the sample were the country's 24 departments, and there were four levels of urban-rural stratification: large cities, small cities and towns, semi-urban areas, rural areas. In addition, clusters in large cities were stratified by wealth using census data. Probability proportional to size sampling was used for first-stage selection.

In order to reduce sampling errors for the estimation of trends, the selected clusters for one semester of each cycle were reused in the next cycle during the 2009-2011 cycles. A similar procedure was followed for the 2012-2014 cycles.

Prior to the selection of dwellings, a listing operation was conducted in all of the clusters selected for a cycle. In the clusters retained from the preceding cycle, the numbers of dwellings to be selected at the second stage were adjusted to reflect changes in the total numbers of dwellings between the cycles.

3.2. Survey Contents

The core Peru CS household and individual questionnaires are based on the standard questionnaires from The DHS Program, with modifications as appropriate to the situation in Peru. The DHS Program domestic violence and maternal mortality modules have been included in all of the Peru CS cycles. Anthropometric measurement, which is standard in The DHS Program, and anemia testing were included all but two rounds of the CS (i.e., 2004 and 2006).

As Table 1 shows, special modules were added to the CS core questionnaires in all of the cycles to address stakeholder interests, beginning with the addition of an extensive environmental health module in the 2006 cycle, requested to be developed by WHO, USAID, and the US EPA and accepted as important by Peru's Ministry of Health. A shortened version of that module was included in all subsequent rounds of the survey. The 2007 cycle included an ethnicity module, requested by the Ministry of the Woman and Vulnerable Populations and designed by GRADE, a Peruvian social research institution. The child labor and early childhood education modules from the UNICEF Multiple Indicator Cluster Survey (MICS) program have been included in the CS since the 2009 cycle, requested by the Ministry of Education. The 2010 CS cycle also included the MICS child discipline module. A chronic disease and trauma module has been included in the CS, beginning the 2010 cycle, requested by the Ministry of Health.

Additional biomarkers also have been added to the Peru CS in response to stakeholder interests. A test for residual chlorine, which is useful in assessing the potability of water, was added beginning with the 2008 cycle, requested by the Ministry of Health. Blood pressure measurement has been included in the CS since the 2010 cycle as part of the chronic disease and trauma module. In the 2010 cycle, INEI also collaborated with the MEASURE Evaluation project and The DHS Program on a pilot of a test to detect *E.coli* in drinking water, at the request of USAID/Washington (Measure/Evaluation) with technical assistance from the University of North Carolina.

---

[1] The 2005 Population Census was rejected by the incoming president due to a dispute with the head of INEI and a disbelief in the lower estimate of the population in favor of the projected total. However the lower estimate was confirmed by the 2007 census.

3.3. Staffing

This section of the report reviews how staffing for the Peru CS evolved over time, particularly with respect to the number and composition of the field teams. This section also looks at key aspects of how data collection activities in CS cycles have been organized.

3.3.1. Staffing in the 2004-2008 cycles

3.3.1.1. Initial staffing proposals

Several considerations guided the initial discussions of how to organize the CS fieldwork. First, it was decided that fieldwork would not be conducted during two month-long periods (mid-July to mid-August and mid-December to mid-January) to allow for the Independence and year-end holidays, vacations, and training. Given that outside of metropolitan Lima, 10 clusters were to be interviewed per year in each department, the initial planning called for one cluster to be completed per month per department, i.e., for 24 clusters to be completed outside Lima during each month of fieldwork.

Four variations in the number and staffing of field teams were initially explored for handling the fieldwork in departments outside Lima:

- Scheme 1: One team of two interviewers per department. This variation involved the recruitment and deployment of 23 teams of two interviewers who would interview two weeks of each month and rest for two weeks. In this scheme, 46 interviewers would work half-time for ten months per year. A perceived advantage of this scheme was reduced interviewer fatigue. Disadvantages included the fact that field staff would not work full-time, potentially contributing to higher turnover if staff preferred full-time employment.
- Scheme 2: One team per two paired departments. This variation involved 12 teams of two interviewers each. Eleven teams would work full-time four weeks per month and one team would work two weeks. There was some concern that team members would tire rapidly in this scheme since it left little room for downtime except in the two months without fieldwork.
- Scheme 3: One team of three interviewers per department. This scheme was similar to Scheme 1 with each team working only two weeks per month, but the added interviewer on each team would permit interviewing in one cluster per week, reducing the overall fieldwork duration.
- Scheme 4: Organize the field work using regional teams and trimesters. This scheme involved six teams of five interviewers who would be responsible for completing 69 clusters per trimester. The scheme required fewer person-weeks per year than any of the other schemes (720 person-weeks versus 920 person-weeks or more). Moreover, training would be somewhat less complicated than in Schemes 1 and 2 since the number of staff was smaller and regionally based.

Finally, it was assumed interviewer production per day would be less in Lima than in the provinces due to the need for more call backs, especially in the more affluent areas. Therefore the use of 4 teams of 2 interviewers per month (160 person-weeks per year) was recommended.

At the planning stage, there was also considerable discussion with regard to the best organization for the headquarters field coordinator staff. Initially, the CS staffing plan called for the following headquarters and field coordinator positions:

National headquarters:

- 1 Survey director—full-time

- 1 Systems analyst—full-time
- 1 Chief of data entry, editing and coding—half-time
- 1 Demographer—half-time
- 1 Demographer—one-third time
- 2 Data entry specialists—half-time each
- 1 Secretary—full-time

Departmental/regional headquarters:

- If fieldwork was organized at the departmental level: 1 coordinator per department—quarter-time
- If fieldwork was organized at the regional level: 1 coordinator per region—full-time

3.3.1.2. Actual staffing plan for 2004-2008 cycles

The initial proposals for CS staffing relied heavily on part-time staff both at the field and headquarters levels. While offering some advantages, it was decided that those designs did not capitalize on the full potential the CS model offered for supporting high quality data collection. Therefore, after additional consultation with INEI staff, the final fieldwork staffing plan involved six teams of two interviewers and one supervisor each. One biomarker technician per team would be hired for the duration of fieldwork during cycles including anthropometry and anemia testing.

Headquarters staff consisted of the following members working full time:

- Survey director
- Sample
- Population and health specialist
- Statistical technician
- Data entry supervisor
- Data entry specialist
- Administrative specialist
- Field work assistant
- Driver

Regional supervision was provided by the directors of the departmental offices of INEI for the four departments where the regional field staff were based.

Six in ten staff employed during the first CS round in 2004 had worked in the 2000 DHS. With regard to qualifications, the supervisors and interviewers were all college graduates from the social sciences and the biomarker technicians were public health nurses. During the 2004-2008 cycles, most CS headquarters and field staff were not permanent INEI employees prior to the CS. The regional directors who supervised the CS staff in the four departments were the exception; they were permanent INEI employees prior to the CS.

3.3.2. Staffing pattern since 2009

The expansion of the survey sample resulted in a considerable expansion of the CS field staff. Currently there are 27 teams with four members each: one supervisor, two interviewers, and one biomarker technician (*antropometrista*). This is more than four times the number of field staff employed in the 2004-2008 CS cycles and only slightly smaller than the field staff employed for the 2000 Peru DHS (see box). Fieldwork supervision is carried out by four national supervisors. They visit the various teams during fieldwork, observe and enforce proper procedures, and answer any questions that may have arisen.

Number and Composition of Survey Teams

2000 Peru DHS - **29 teams** including 1 supervisor, 1 field editor, 4 interviewers, and a driver

2004-2008 Peru CS – **6 teams** including 1 supervisor, 2 interviewers, and a biomarker specialist in the 2005, 2007 and 2008 rounds

2009-2014 Peru CS – **27 teams** including 1 supervisor, 2interviewers, and 1 biomarker specialist

The headquarters staff has retained the same basic structure as in the 2004-2008 cycles. Headquarters staff increased from 14 in 2007 to 40 and 43 persons in 2008 and 2009, respectively, with the expansion of the sample size but then decreased to 23 in 2012 with efficiency improvements.

The employment status of the field and headquarters staff also has changed in the current CS rounds. All continuous survey staff have been INEI employees since 2009 rather than temporary project hires, with all the benefits (health insurance, retirement, vacation, sick leave, and so forth) that are part of government employment.

3.4. Timetable

During the 2004-2008 cycles, fieldwork took place between mid- to late January and the end of September. Relisting of households in the clusters began in mid-October and ran until the end of November. Pretesting revisions in the questionnaire occurred in November or early December. Training for the new cycle occurred at the beginning of January in Lima. In addition, in April interviewers and supervisors were brought back to Lima for a one-week standardization seminar.

During the 2009-2014 cycles, the timetable for fieldwork shifted slightly. To allow for a longer summer vacation, the field teams are now brought to Lima during February to train and fieldwork begins in March. New interviewers are trained for three weeks and returning interviewers are trained for one week. Biomarker technicians are trained for two weeks or one week depending on whether they are new or returning and are required to be certified. As in the earlier rounds, a one-week standardization training is conducted in April or May that brings the fieldwork teams back to Lima where questions and difficulties are elicited and responses given to ensure that comparable solutions are made.

3.5. Fieldwork Organization and Implementation

3.5.1. Deployment of field teams

During the 2004-2008 CS cycles, the field teams were deployed on a regional basis. Two of the six teams were based in Lima. The other four teams were based in the cities of Arequipa, Chiclayo, Iquitos, and Huancayo. A seventh "flying" team, made up of headquarters staff was used for "mopping up" operations, that is, where clusters should be revisited to complete the interviewing as well as assisting regional teams where climatic conditions slowed fieldwork.

In the 2009-2014 rounds of the survey, 24 of the 27 teams were based in the capital of each of the departments outside Lima. Three teams were based in Lima, and were responsible for metropolitan Lima (Province of Lima and Constitutional Province of Callao) and one was assigned to the Department of Lima outside the metropolitan area. Supervision was carried out by four national supervisors.

During each cycle of the CS, fieldwork has been divided into two halves, using a representative sample for each half. Teams generally remain in a cluster between four and six days in order to complete call backs to households and individuals.

Local (within department) transportation is used by all teams except by those teams in Lima, where headquarters vehicles are available to drop off and pick up teams daily. Supervisors are provided with funds to pay for local transportation. The use of local transport offers considerable cost savings over using INEI vehicles and paying the costs of drivers or renting vehicles and paying for drivers.

3.5.2. Field staff roles

In all CS cycles, interviewers have been responsible for the household listing prior to the survey. During each round of the CS data collection, they have conducted the household and individual woman interviews, observed household conditions, and tested salt for presence of iodine and water for presence of free chlorine. Since 2007, interviewing is done mostly with Hewlett Packard personal digital assistants (PDAs) using CSPro-based computer-assisted personal interviewing (CAPI) software. Anthropometry and anemia results are first entered onto paper forms and then transferred into the PDAs in the field.

The role of the biomarker technician is to conduct the height and weight measurements, anemia testing, and blood pressure measurement. The biomarker technician is specially trained and certified and does not interview. The interviewers assist the biomarker technician but do not take the measurements on their own, as they are not trained for them.

3.5.3. Interviewing

All selected dwellings are visited to obtain household interviews. If more than one household lives in a dwelling, all households are interviewed. Households in dwellings not in the sample list that are between the selected dwelling and the next listed dwelling are also interviewed in order to avoid omission bias, especially from newly constructed dwellings (known as the half-open interval interviewing procedure). The use of the half-open interval has been used in Peru for surveys in the 1970s and 1980s, when rural-to-urban migration was at its highest, but is not standard procedure for DHS fieldwork. It was incorporated into the Peru CS, given the large amount of new construction taking place in Peru.

Both usual household members and overnight household visitors are eligible for interview. Usual members who did not sleep in the household the night before the household interview are also eligible for individual interview in order to minimize exclusion bias.

Call backs are made if the household cannot be interviewed on the first visit. Similarly, all eligible persons are interviewed with call backs made. While this procedure was always used in the Peru DHS, the slower pace of fieldwork of the Peru CS allows a greater opportunity for call backs as the team stays in the cluster between four and six days whereas in a standard DHS the team is in the cluster for about three days.

3.6. Data Processing

Data processing activities during the 2004-2006 cycles of the Peru CS followed standard DHS practices for surveys with paper questionnaires. Data entry and editing were carried out in parallel with data collection, and feedback was provided to field teams based on the errors identified during the entry and editing process and on the results of the DHS field check tables regularly run during the data collection.

In 2006, an experiment was undertaken in which one CS field team used CAPI with palmtop computers instead of paper questionnaires to collect information from respondents. CAPI alerts interviewers to potential errors including out-of range responses, errors in following skip instructions, and inconsistencies between responses, for example, in dates recorded in the birth history. It allows many errors previously identified only during office entry and editing operations to be corrected at the point of interview, thus, improving the quality of the information collected. The 2006 CAPI experiment was a success and CAPI, with palmtops, has been standard in the Peru CS since the 2007 cycle.

Data from the 2004-2008 CS cycles are available as a single data file because the clusters selected for each cycle were a subset of 2000 Peru DHS sample clusters and, thus, the results could be integrated as a single sample. Data from individual or multiple cycles can be analyzed by selecting on a variable that designates the data collection year. Separate datasets are available for the 2009-2013 cycles because the samples were independently drawn for each of the cycles although half of the clusters were repeated from the prior cycle.

3.7. Data Dissemination

This section briefly reviews key data dissemination activities adopted for the Peru CS.

3.7.1. CS standard reports

Reporting results on a timely basis while managing ongoing survey operations is among the most challenging tasks within a continuous survey framework. This section considers how approaches to reporting the Peru CS findings changed over time, adapting both to the demands of the continuous survey operation and to the expanded emphasis on department-level results.

3.7.1.1. 2004-2008 cycle reports

As discussed earlier, the initial design for the CS assumed that a representative national sample would be interviewed in all three trimesters during each annual cycle. It called for tabulations to be prepared every trimester. These tabulations were for internal use to check on data quality. It was proposed that there would be two reports prepared during each cycle, a preliminary report after two trimesters and a main report after data collection was completed for the cycle. However, once it was decided that there would only be two rounds per cycle, INEI revised the initial reporting plan. According to the revised reporting plan, an initial report was prepared for internal use by government agencies after data collection was completed for the first round in each cycle. A second preliminary report was published when a clean raw data file was available for a cycle. An annual main report was prepared once the standard recode file was available.

Following the first cycle, the design called for moving averages of data from multiple cycles to be presented in the annual report. Thus, the second Peru continuous survey report pooled 2004 and 2005 data, the third report pooled 2004 to 2006 data, allowing for the reporting of results at the department level, and the fourth report pooled 2007 to 2008 data.

3.7.1.2. 2009-2013 cycle reports

For recent cycles of the survey, four types of reports are being produced annually. The first report, a preliminary report at the national level using the representative first-half sample data, is produced in July for the Peruvian Congress' budget discussions and for use in the president's Peruvian Independence Day speech (a state of the union address on July 28). A second preliminary report based on the full sample is produced in January from the previous year's data collection (which ended in November or early December) for the budgeting-by-results section of the Ministry of Economics to assist in the setting of state-level health program budgets. The main survey report is presented at a national seminar at the beginning of May when the standard recode data set is also released. State level reports are produced for each of the 24 states later in the year.

3.7.2. Other dissemination and data use activities

INEI provides extensive information on the continuous survey methodology and distributes the reports and data sets for all of the Peru CS cycles as well as earlier DHS surveys through its website (http://desa.inei.gob.pe/endes/) as well as on CD and on paper (report only). The website also includes links to a number of summary reports and bulletins prepared using the CS survey data and special studies published by INEI. The special reports include two studies on the state of children in Peru produced with UNICEF support (INEI and UNICEF 2010; INEI and UNICEF 2011). The main project reports and datasets are also available on the www.dhsprogram.com website. No information is available on the number of datasets downloaded directly from the INEI website; however, to date, the Peru CS datasets have been downloaded from The DHS Program website by more than 1,000 program analysts and researchers.

4. Key Continuous DHS Survey Goals and the Peru Experience

In addition to providing an overview of how a continuous DHS was designed and successfully implemented, this retrospective look at the Peru CS offers the opportunity to consider how the Peru experience performed in achieving several key goals identified in the original CS concept. These include: (1) strengthening host country capacity to manage DHS data collection; (2) creating a stakeholder base able to understand and effectively use output from a continuous DHS; and (3) implementing annual surveys within the same cost parameters as a DHS survey conducted at five-year intervals. Finally, the Peru experience also allows for an assessment of the strengths and weaknesses of the continuous survey approach in providing data for measuring trends and short-term changes in key population and health indicators.

4.1. Strengthening Host Country Capacity to Conduct the DHS

A key perceived benefit of a continuous survey is the greater potential it offers over the standard DHS design to strengthen host country capacity to conduct the DHS. The investment in the early cycles of the Peru CS has clearly paid off in the development of capacity within INEI to independently manage CS operations.

A critical factor in the development of this capacity was the establishment of a permanent DHS unit within INEI at the beginning of the CS activity. This offered a strong motivation for high quality performance among CS staff, particularly the field staff, because they had longer term job prospects at stake. The unit also was able to take advantage of a pool of headquarters and field staff who had worked in the 2000 and earlier Peru DHS surveys. Thus, in the initial CS cycle in 2004, 75 percent of the headquarters staff, 64 percent of the field supervisory personnel, and 67 percent of the field supervisory and interviewing staff had prior experience with the DHS. Because the number of headquarters and field staff needed in the initial CS cycles was much more limited than in a standard DHS, these staff were recruited from among the best performers in the earlier surveys.

Another factor supporting capacity strengthening was the fact that staff retention rates have been high throughout the CS. For example, 92 percent of the CS headquarters staff and 82 percent of field supervisory personnel in the 2005 CS cycle had worked in the 2004 round or the earlier DHS surveys. The majority of the field staff also had prior experience (73 percent). The retention rate for the 2006-07 cycles was similarly high (82 percent for headquarters staff, 86 percent for field supervisory staff, and 81 percent for field staff). When the CS staff was expanded in response to the expansion of the sample in 2009, staff from the early cycles of the CS formed the core of the expanded CS personnel base. Retention rates after 2009 CS cycle have continued to be high; in the 2012 cycle, 87 percent of the headquarters staff, 96 percent of the supervisory staff, and 56 percent of the field staff had participated in prior CS or DHS surveys.

The permanent nature of the Peru CS employment has not only contributed to high field staff retention rates but also has created a strong esprit de corps among the field staff that supports high quality performance. This is evidenced in a document (INEI 2011) developed by the Peru CS staff on their own initiative that highlights their own experiences and personal commitment to the DHS (see box).

A third factor supporting the institutionalization of DHS capacity was the strong leadership from the Peru CS survey directors, all of whom had either extensive DHS survey, census, or other household survey experience.

A fourth factor was the fact that The DHS Program targeted technical assistance activities toward transferring responsibility for key activities to the CS unit staff. For example, special training was provided on CSPro in the early CS cycles including several workshops. As a result of these efforts, the Peru CS was able to take on full responsibility for all data processing tasks, including the CAPI programming, beginning with the 2009 cycle. Overall, technical assistance from The DHS Program became progressively more limited with each round and the Peru CS is now carried out with virtually no external assistance.

Voices of the 'Warrior Girls of the Peru DHS'

The success of our work depends greatly on the level of integration we achieve among team members…It all sounds pretty simple, but it is difficult; it's hard work to achieve unity in our principles and work codes: punctuality, respect, commitment, solidarity, and honesty.

…The appropriate interview technique… is more than a simple routine. It is an art that involves probing and identifying the best conditions conducive to achieving or gaining the trust of the interviewee and those around him or her. We need them, and we have a duty to them.

Upon completing this experience, I was left with a sense of teamwork, a crucial component that is the pillar of the DHS. We must always remember that we are and must be a team, a prerequisite for applying our interviewing methods.

4.2. Creating an Informed Stakeholder Base

One of the main challenges that a continuous DHS survey faces is promoting widespread dissemination and use of the survey results. This challenge is shared with standard DHS surveys and, thus, is not unique to a CS. However, the nature of a continuous survey, in which there is a very short timetable between the end of fieldwork for one cycle and the beginning of data collection for the next cycle, adds a special dimension to the tasks of effectively disseminating the survey results and creating an informed stakeholder base. This challenge is further complicated if data from a continuous survey must be pooled across several cycles, e.g., to provide subnational estimates as was the case in the initial cycles of the Peru CS. Stakeholders must be educated about how indicators produced from the pooled data may differ from the standard DHS current status measures with which they are familiar.

In an external evaluation of the initial cycles of the Peru CS carried out in 2007, Becker and Pullum (2007) identified the unfamiliarity with the moving average calculated from data pooled over several CS cycles as a disadvantage in promoting use of the CS results with some researchers and users. Changes were made in reporting CS results to address the concerns, including using central dates for assigning times to rates in report tables and working to educate users in how to read and understand the tables in the reports in which pooled data was presented in the initial Peru CS cycles.

Although these adjustments helped to improve stakeholder acceptance and informed use of the pooled data, the initial cycles of the Peru CS highlighted the fact that new methods of dissemination of data sets are clearly required within a continuous DHS framework. For example, where data are pooled for reports, should individual year cycles of datasets be distributed or should pooled datasets be distributed? In statistical compilations such as The DHS Program's StatCompiler (www.statcompiler.com), how should continuous data be handled, especially when pooling is needed for lower level indicators? These are questions which have not yet been resolved satisfactorily.

The Peru CS experience also highlighted the importance of setting aside from the beginning substantial resources for data dissemination and analysis activities within the continuous survey design. In their evaluation of the initial rounds of the Peru continuous DHS, Pullum and Becker (2007) recommended augmenting the CS dissemination efforts including attention to more user-friendly reports and data files, dissemination seminars for policy makers, and data analysis workshops. The expanded mandate of the CS to provide department-level data after 2008 has increased the need for CS dissemination materials in user-friendly formats targeted to non-technical audiences (Walter Mendoza, UNFPA Peru, personal communication, June 19, 2014).

Capacity building in how to correctly interpret the CS data is especially needed for those individuals who are expected to be using the data on an on-going basis in making program and policy decisions at the subnational level. Given the special challenges of using the CS data sets, especially for trends analyses, there is a continuing need for support to program analysts and other researchers using the CS datasets. The results of the CS are clearly utilized and valued in program planning, monitoring, and budgeting activities within Peru. However, there are clearly missed opportunities for expanding awareness and use of the data because the Peru CS budgeting has not included more substantial resources for more widely promoting data dissemination and use activities.

4.3. Implementing the CS within the Same Cost Parameters as a Standard DHS

One of the key benefits of the CS concept was its potential for satisfying the need of host country organizations, USAID, and other donors for annual program tracking data over a five-year period at a cost equivalent to fielding a standard DHS. It is difficult to exactly assess how well the Peru CS met that objective since there was a significant expansion in the CS sample size after the fourth cycle and a further expansion beginning with the sixth cycle (Table 1). However, an analysis of the local survey budgets suggests that, controlling for inflation and currency fluctuations, the first four cycles of the CS, which most closely conform to the original continuous survey concept, cost a total of $1,396,332 in constant 2000 dollars. This is roughly similar to $1,342,391 local cost budget for the 2000 Peru DHS. Although the five-year costs of the Peru CS would have been somewhat greater, this suggests that it is possible to conduct a CS within the general constraints of a standard DHS budget, providing that stakeholders are willing to accept the limitations relating to subnational estimates inherent within the original CS concept.

As a result of performance-based budgeting mandates, stakeholders in Peru asked for a greatly expanded sample beginning with the 2008 CS cycle. To meet stakeholder requirements, the size of household sample in each of the 2009-2013 cycles was increased to roughly the size of the 2000 DHS sample (28,900 households). Since 2009, the annual cost of the CS has averaged $2 million or more, reflecting the sample expansion. The Government of Peru is fully supporting these costs, which are similar to a standard DHS, in INEI's annual budget.

4.4. Utility of CS Data for Tracking Trends and Short-term Changes

One of the major factors fueling interest in the continuous survey modality within The DHS Program has been the demand from host country governments, USAID missions, and other donors for annual reporting data. One concern in relying on DHS surveys to meet that demand is the fact that the year-to-year change in many of the key indicators, e.g., contraceptive use, is typically quite small. Moreover, for fertility and mortality rates, there is considerable overlap in the periods for which the rates are calculated in any year-to-year comparisons, making it particularly problematic to assess annual change in those measures. For these reasons, in order to be able to evaluate the significance of small changes, sample sizes have to be large.

An examination of the results of tests of the significance of trends in six programmatically important indicators—modern contraceptive use, skilled delivery assistance, child immunization and stunting, fertility, and under-five mortality—in the 2009-2012 Peru CS illustrates the dilemma. The significance of the differences in each of the six indicators was evaluated at the national, urban-rural, and department level for each pair of cycles (i.e., 2009-2010, 2010-2011, and 2011-2012). Differences in the indicators for the two-year interval between the 2009 and 2011 cycles and the three-year interval between the 2009 and 2012 cycles were also assessed for significance. As noted above, half of the clusters in the 2010 and 2011 rounds were repeated from the prior round, an approach which was adopted to reduce the variance and improve the precision of trends estimates.

For each of the four CS cycles, Appendix Table 1 shows the values, standard errors, and weighted and unweighted number of cases on which the calculations of each of the six indicators were based at the national, urban-rural, and department levels. Appendix Table 2 summarizes the results of the assessments of the significance of the differences for each of the paired annual cycles and for the 2009-2011 and 2009-2012 intervals.

At the national level, differences between the 2009 and 2010 cycles were found to be significant for only two of the six indicators (medically-assisted delivery and immunization rates). Similarly, between the 2010 and 2011 cycles, differences were significant for two indicators (immunization and stunting rates). None of differences in the indicators between the 2011 and 2012 cycles were significant. As one might expect, significant differences were found for a greater number of indicators when the interval between the cycles being compared was longer. Differences were significant for three indicators in the 2009-2011 comparisons (medically-assisted delivery, immunization, and stunting rates) and four indicators in the 2009-2012 comparisons (modern contraceptive use, medically-assisted delivery, immunization, and stunting rates).

Reflecting the smaller sample sizes, significant differences were found much less often at subnational levels, both in comparisons of annual changes and in the changes over the longer intervals. Even though annual changes for most indicators were not significant at the department level, the differences in the immunization rates were significant in one or more of the annual comparisons for 13 of the 24 departments. These changes were important in confirming that programmatic initiatives to improve child immunization were having the desired impact.

In assessing the utility of the continuous survey in tracking trends, it is also important to recognize that monitoring the direction of annual change in priority indicators may be important, even if samples sizes are not sufficiently large to detect significant changes from one year to the next. In particular, evidence over several years of a lack of significant change in key indicators that are targeted in special program initiatives would definitely be cause for a review of the reasons that the initiatives are not achieving desired changes. Annual monitoring of the pattern of change also can provide early warning of undesired deviations, e.g., a drop in immunization or contraceptive use rates.

5. Lessons Learned from the Peru CS for Other Countries

The Peru CS has been successfully institutionalized as a critical component of the country's results-based budgeting system. External technical assistance has been virtually eliminated and the survey is wholly funded by the government. The following summarizes factors that appear to have played a critical role in ensuring the success of the CS model in Peru. While each application of the model is likely to be unique, the lessons learned from the Peru experience will hopefully prove useful to other countries that may consider implementing a continuous DHS survey.

Implementing Organization. INEI was in many ways an ideal host for the first continuous DHS survey. At the time the CS was proposed, INEI was recognized as a strong statistical agency whose staff had considerable breadth and expertise in general survey implementation and, specifically, in DHS implementation. More generally, INEI had adequate government funding to support its staff and to carry out its regular statistical operations. Countries which lack these basic elements are obviously not good candidates for a continuous survey.

Emerging Demand for Annual Data. At the time the CS was proposed in Peru, the country was decentralizing government functions and was also moving to results-based budgeting. These twin forces were instrumental in shaping the design of the Peru CS and in creating the strong demand for annual DHS results. Countries considering the implementation of a continuous DHS survey need to realistically assess if systems are in place (or can be put in place) to effectively disseminate and utilize the annual data that a continuous survey will generate. If not, a continuous survey may still make sense if it is seen as an investment in building demand for a results-based management within governmental institutions.

Establishment of a Permanent Continuous Survey Unit. Early in the process of designing the Peru CS, consideration was given to several fieldwork organization scenarios, all of which involved the use of part-time field staff. A decision was finally made to employ a smaller field staff year-round. Eventually, the CS staff became permanent INEI employees. Although it is not possible to compare the results to outcomes of other models, the establishment of a permanent unit within INEI is seen as a critical element in the survey's success.

Sample Design Considerations. The Peru CS demonstrated the advantage of reusing clusters from the 2000 DHS for the CS sample. The approach reduced sample variance and, thus, improved the utility of the CS for supporting trends analyses. If a country plans to reuse DHS sample clusters, it will be important to develop a comprehensive design for the continuous survey at the time of the baseline standard DHS is planned. Implementation of the continuous survey should begin if at all possible the year after the baseline DHS. The continuous survey sample design should also take into account is how the sample will be updated over time.

Donor and Host Country Funding Commitments. The Peru CS greatly benefited from the fact that, in the early years, USAID Peru funded almost the entire local survey costs as well as the technical assistance from The DHS Program. The fact that USAID funded the Peru CS operations guaranteed the steady stream of funding that was necessary to ensure that there were no disruptions in the CS implementation. Most countries considering the implementation of a continuous DHS survey will not have the luxury Peru had of a single donor during the initial years of the survey. The need to obtain and then to sustain funding commitments from multiple donors as well as the host country government will pose significant challenges. Continuous survey management will have to spend considerable time on managing the fund raising and meeting reporting requirements and the resources needed for these activities must be included in the continuous survey budget. Donors helping to fund a continuous survey also must commit to timely disbursement of funding since serious delays in the flow of funding will have an even more disruptive effect on a continuous survey than on a standard DHS.

Accommodating the Demand for Subnational Results. The initial Peru CS design addressed the need for subnational department-level indicators by pooling data across cycles of the survey. That approach was not readily understood by stakeholders. Moreover, the sample sizes involved in the initial cycles of the Peru CS were not large enough even when pooled to meet the demand for department-level data within Peru's budgeting-by-results framework. To meet the demand for annual department-level data, the Peru CS first expanded in size in the 2008 round from about 6,300 to 23,000 households and then increased in subsequent cycles to 29,000 households. The 2015 round will involve more than 35,000 households, about six times the original annual sample size, in order to provide county-level data in program priority departments. Of course, as the sample expanded so did the survey costs.

Virtually all countries fielding DHS surveys are experiencing expanding demand for subnational data. In the planning phase for a continuous survey, therefore, it will be important to carefully consider whether the pressure to meet those needs is likely to result in substantial increases in the sample size over time and, if so, whether or not an expanded continuous survey design represents a cost-effective approach to addressing the expanding demand for annual subnational results.

In summary, the continuous DHS survey was proposed as an alternative to an interim DHS survey in Peru because it addressed increasing demands on the part of the government and donors for annual tracking on key health indicators. Annual reporting was subsequently required within the Peru's budgeting-by-results framework in which funding is allocated according to evidence of the attainment of the annual goals for health programs set for each department. Other programs in Peru also required annual data including the conditional transfer program, Juntos (MIDIS 2012), which is evaluated department-by-department using the CS. The continuous DHS survey model has clearly served Peru's annual reporting requirements.

In countries that do not have mandated annual reporting requirements like Peru, it will be important to weigh whether the continuous DHS survey approach, a combination of a standard and interim DHS surveys, or investments in other data collection alternatives will best meet the country's monitoring needs. In making that decision, it is important to recognize that the slow pace of change for many health indicators makes it difficult to detect significant trends on a year-to-year basis, even with a comparatively a large sample. The Peru experience also suggests that the continuous survey model is likely to be more costly during a five-year period than a combination of an interim and a standard DHS survey, particularly when there is demand for data at lower administrative levels. Despite these concerns, there are a number of potential benefits to a continuous survey that make it an option to consider. These benefits include a greater opportunity for institutionalizing the capacity to conduct the DHS and greater county buy-in and ownership of the DHS results; improvements in data quality through interviewer retention; increased timeliness of data and the ability for early detection of unexpected changes in health indicators and the ability to include special topics and modules without overburdening the survey.

References

Agence Nationale de la Statistique et de la Démographie (ANSD) [Sénégal] et ICF International. 2012a. *Enquête Démographique et de Santé Continue (EDS-Continue 2012-2013)*. Calverton, Maryland, USA: ANSD et ICF International.

Agence Nationale de la Statistique et de la Démographie (ANSD) [Sénégal] et ICF International. 2012b. *Enquête Continue sur la Prestation des Services de Soins de Santé(ECPSS) du Sénégal 2012-2013*. Calverton, Maryland, USA: ANSD et ICF International.

Becker, S., and T. Pullum. 2007. *External Evaluation of the Peru Continuous Survey Experiment. Report number 07-001-48.* Washington D.C., USA: The Global Health Technical Assistance Project.

Calvo-Gonzalez, O. 2010. *Peru: The Decentralization Process and Its Links with Public Expenditure Efficiency*. Washington D.C., USA: World Bank, Poverty Reduction and Economic Management, Bolivia, Chile, Ecuador, Peru, and Venezuela Country Management Unit.

Instituto Nacional de Estadistica e Informatica (INEI), Agencia de los Estados Unidos Para el Desarrollo Internacional (USAID), and Programa Measure DHS+/ORC Macro. 2005. *Perú Encuesta Demográfica y de Salud Familiar ENDES Continua 2004.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Agencia de los Estados Unidos Para el Desarrollo Internacional (USAID), and Macro International Inc. 2006. *Perú Encuesta Demográfica y de Salud Familiar ENDES Continua 2004/5.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Agencia de los Estados Unidos Para el Desarrollo Internacional (USAID), and Macro International Inc. 2007. *Perú Encuesta Demográfica y de Salud Familiar ENDES Continua 2004-2006.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Agencia de los Estados Unidos Para el Desarrollo Internacional (USAID), and MEASURE DHS. 2008. *Indicadores de Resultado Identiifiicados en Los Programas Estratégicos: Endes Línea De Base.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Agencia de los Estados Unidos Para el Desarrollo Internacional (USAID), and ICF Macro. 2009. *Perú Encuesta Demográfica y de Salud Familiar ENDES Continua 2007-2008.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Agencia de los Estados Unidos Para el Desarrollo Internacional (USAID), Ministerio de Economía y Finanzas, and Dirección Nacional del Presupuesto Público. (2000-1er. Semestre 2010). 2010. *Indicadores de Resultados Identificados en Los Programas Estratégicos.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Agencia de los Estados Unidos Para el Desarrollo Internacional (USAID), Ministerio de Economía y Finanzas, and Dirección Nacional del Presupuesto Público. 2010. *Indicadores de Resultados Identificados en Los Programas Estratégicos, 2000-2009.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), and ICF Macro/MEASURE DHS. 2010. *Perú Encuesta Demográfica y de Salud Familiar ENDES Continua 2009.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI). 2011. *Warrior Girls of the Peru DHS—Anecdotes*. Unpublished report.

Instituto Nacional de Estadistica e Informatica (INEI), and ICF Macro. 2011. *Perú Encuesta Demográfica y de Salud Familiar ENDES Continua 2010.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Ministerio de Economía y Finanzas, and Dirección Nacional del Presupuesto Público. 2011. *Indicadores de Resultados de los Programas stratégicos, Primer Semestre 2011 Encuesta Demográfica y de Salud Familiar (Resultados Preliminares).* Lima, Peru: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), and ICF International. 2012. *Perú Encuesta Demográfica y de Salud Familiar ENDES Continua 2011.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Ministerio de Economía y Finanzas, and Dirección Nacional del Presupuesto Público. 2012. *Indicadores de Resultados de los Programas stratégicos, Primer Semestre 2012 Encuesta Demográfica y de Salud Familiar (Resultados Preliminares).* Lima, Peru: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Ministerio de Economía y Finanzas, and Dirección Nacional del Presupuesto Público. 2013. *Perú Indicadores de Resultados de los Programas Estratégicos, 2007–2012, Encuesta Demográfica y de Salud Familiar – ENDES (Resultados Preliminares).* Lima, Peru: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), and ICF International. 2013. *Perú Encuesta Demográfica y de Salud Familiar ENDES Continua 2012.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Ministerio de Economía y Finanzas, and Dirección Nacional del Presupuesto Público. 2013. *Indicadores de Resultados de los Programas stratégicos, Primer Semestre 2013 Encuesta Demográfica y de Salud Familiar (Resultados Preliminares).* Lima, Peru: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Ministerio de Economía y Finanzas, and Dirección Nacional del Presupuesto Público. 2013. *Perú Indicadores de Resultados de los Programas Estratégicos, 2007–2012, Encuesta Demográfica y de Salud Familiar – ENDES (Resultados Preliminares).* Lima, Peru: INEI.

Instituto Nacional de Estadistica e Informatica (INEI). 2014. *Perú Encuesta Demográfica y de Salud Familiar ENDES Continua 2013.* Lima, Perú: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Ministerio de Economía y Finanzas, and Dirección Nacional del Presupuesto Público. 2014. *Indicadores de Resultados de los Programas stratégicos, Primer Semestre 2014 Encuesta Demográfica y de Salud Familiar (Resultados Preliminares).* Lima, Peru: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), Ministerio de Economía y Finanzas, and Dirección Nacional del Presupuesto Público. 2014. *Perú Indicadores de Resultados de los Programas Estratégicos, 2007–2013, Encuesta Demográfica y de Salud Familiar – ENDES (Resultados Preliminares).* Lima, Peru: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), and UNICEF. 2010. *Estado de la Indígena Niñez en el Perú*. Lima, Peru: INEI.

Instituto Nacional de Estadistica e Informatica (INEI), and UNICEF. 2011. *Estado de la Niñez en el Perú.* Lima, Peru: INEI.

Ministry of Development and Social Inclusion (MIDIS). 2012. *A policy for development and social inclusion in Peru*. Lima, Peru: MIDIS.

Rutstein, S. 1995. *The Case for the Permanent Survey*. Unpublished memorandum.

Rutstein, S. 2022. *The Case for the Permanent or Continuous DHS Survey*. Unpublished memorandum.

Appendix

Appendix Table 1. Sampling errors for selected indicators in the 2009-2012 Peru Continuous Survey (CS), by urban-rural residence and department

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)
Peru																
Currently using a modern method	0.50	0.006	14,637	13,828	0.51	0.006	13,626	13,040	0.51	0.006	13,480	12,673	0.52	0.007	14,326	13,756
Medically assisted delivery	0.83	0.008	10,289	9,305	0.85	0.008	9,281	8,484	0.86	0.007	9,146	8,426	0.88	0.006	9,690	8,900
Fully immunized	0.51	0.016	1,876	1,639	0.59	0.016	1,885	1,747	0.71	0.014	1,847	1,715	0.74	0.014	1,906	1,751
Height-for-age below -2 SD	0.24	0.007	9,782	9,113	0.23	0.007	9,219	8,667	0.20	0.007	9,011	8,852	0.18	0.006	9,620	9,104
Total fertility rate	2.61	0.051	67,928	68,144	2.53	0.053	64,429	64,530	2.59	0.054	63,195	63,379	2.56	0.046	67,676	67,965
Under-five mortality rate	25.70	2.045	10,455	9,467	22.81	2.038	9,444	8,631	21.18	1.855	9,288	8,549	21.07	2.005	9,811	9,002
Urban-rural residence																
Urban																
Currently using a modern method	0.53	0.008	8,860	9,622	0.54	0.008	8,129	9,062	0.54	0.008	7,955	8,769	0.55	0.009	8,880	9,672
Medically assisted delivery	0.94	0.005	5,652	5,994	0.96	0.005	5,028	5,447	0.96	0.005	4,973	5,506	0.96	0.004	5,647	5,866
Fully immunized	0.53	0.021	1,077	1,092	0.59	0.021	1,052	1,136	0.74	0.017	1,015	1,123	0.75	0.019	1,113	1,159
Height-for-age below -2 SD	0.14	0.007	5,320	5,762	0.14	0.007	4,952	5,464	0.10	0.006	4,931	5,654	0.11	0.006	5,546	5,863
Total fertility rate	2.27	0.055	44,693	50,983	2.19	0.057	41,576	47,762	2.29	0.062	40,804	47,460	2.27	0.049	45,641	51,091
Under-five mortality rate	21.76	1.807	11,036	11,838	21.44	2.086	10,217	11,098	18.01	1.926	9,930	10,942	20.96	1.807	11,305	11,885
Rural																
Currently using a modern method	0.42	0.011	5,777	4,206	0.43	0.011	5,497	3,978	0.44	0.010	5,525	3,904	0.45	0.010	5,446	4,085
Medically assisted delivery	0.61	0.017	4,637	3,311	0.67	0.018	4,253	3,037	0.68	0.018	4,173	2,920	0.72	0.016	4,043	3,034
Fully immunized	0.48	0.023	799	547	0.57	0.024	833	611	0.66	0.022	832	592	0.72	0.021	793	593
Height-for-age below -2 SD	0.40	0.014	4,462	3,351	0.39	0.012	4,267	3,203	0.37	0.014	4,080	3,027	0.32	0.012	4,074	3,241
Total fertility rate	3.61	0.094	23,235	17,162	3.51	0.096	22,853	16,768	3.51	0.088	22,391	15,919	3.46	0.095	22,035	16,874
Under-five mortality rate	46.34	3.014	9,422	6,818	36.84	2.490	8,885	6,434	39.48	2.615	8,920	6,222	32.88	2.407	8,545	6,391
Department																
Amazonas																
Currently using a modern method	0.51	0.027	662	219	0.45	0.027	565	186	0.44	0.033	610	193	0.44	0.034	603	228
Medically assisted delivery	0.64	0.042	479	157	0.79	0.026	423	139	0.63	0.050	463	146	0.68	0.050	448	168
Fully immunized	0.59	0.047	94	31	0.61	0.064	83	27	0.54	0.054	86	27	0.61	0.064	84	32
Height-for-age below -2 SD	0.27	0.028	479	165	0.23	0.027	434	149	0.31	0.023	463	156	0.27	0.032	455	181
Total fertility rate	3.14	0.232	2,675	891	2.84	0.211	2,600	866	3.40	0.284	2,509	799	3.35	0.332	2,469	935
Under-five mortality rate	32.01	5.362	982	324	36.37	6.514	847	277	32.22	5.413	981	313	21.96	5.488	909	338

(Continued...)

Appendix Table 1. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)
Ancash																
Currently using a modern method	0.47	0.027	597	551	0.50	0.027	557	502	0.46	0.023	607	556	0.48	0.015	650	650
Medically assisted delivery	0.83	0.032	421	386	0.90	0.021	379	333	0.90	0.018	379	346	0.90	0.022	411	412
Fully immunized	0.58	0.053	81	75	0.61	0.051	76	66	0.67	0.058	86	77	0.80	0.043	83	89
Height-for-age below -2 SD	0.28	0.032	419	407	0.29	0.029	375	347	0.25	0.027	373	360	0.25	0.031	417	437
Total fertility rate	2.73	0.196	2,873	2,678	2.34	0.132	2,692	2,452	2.74	0.202	2,771	2,577	2.80	0.164	3,121	3,049
Under-five mortality rate	26.48	4.615	873	799	20.78	5.195	790	695	17.24	4.208	777	704	28.67	5.055	857	861
Apurimac																
Currently using a modern method	0.50	0.027	531	230	0.48	0.043	495	229	0.49	0.036	482	233	0.51	0.024	488	231
Medically assisted delivery	0.94	0.014	392	171	0.98	0.007	341	164	0.97	0.009	326	159	0.99	0.006	310	147
Fully immunized	0.55	0.060	82	36	0.85	0.052	79	38	0.86	0.047	73	36	0.88	0.040	75	34
Height-for-age below -2 SD	0.35	0.026	366	169	0.42	0.038	348	174	0.36	0.032	327	169	0.28	0.048	309	158
Total fertility rate	3.53	0.212	2,140	923	3.37	0.293	2,157	994	3.02	0.291	2,175	1,040	2.99	0.211	2,221	1,010
Under-five mortality rate	31.02	7.188	828	358	31.59	5.487	744	354	22.92	4.716	736	361	31.95	6.128	674	322
Arequipa																
Currently using a modern method	0.56	0.025	497	576	0.48	0.025	461	544	0.46	0.022	481	566	0.53	0.019	501	503
Medically assisted delivery	0.94	0.017	265	309	0.96	0.016	280	331	0.97	0.010	271	315	0.94	0.024	307	309
Fully immunized	0.46	0.074	51	62	0.68	0.055	60	68	0.79	0.056	49	58	0.71	0.064	60	60
Height-for-age below -2 SD	0.12	0.026	250	304	0.12	0.023	273	337	0.06	0.020	254	316	0.09	0.023	300	319
Total fertility rate	2.34	0.201	2,431	2,796	2.22	0.177	2,408	2,834	2.28	0.178	2,352	2,744	2.50	0.218	2,614	2,585
Under-five mortality rate	31.80	8.304	538	624	15.35	5.086	547	639	10.21	4.132	532	616	13.28	4.160	610	618
Ayacucho																
Currently using a modern method	0.41	0.025	565	334	0.42	0.027	583	364	0.45	0.019	602	399	0.46	0.029	595	436
Medically assisted delivery	0.93	0.018	431	251	0.90	0.031	461	283	0.90	0.025	419	273	0.93	0.019	435	321
Fully immunized	0.53	0.057	82	48	0.63	0.063	69	41	0.74	0.052	86	53	0.63	0.058	83	62
Height-for-age below -2 SD	0.41	0.023	431	261	0.37	0.034	467	303	0.34	0.031	414	284	0.26	0.027	429	339
Total fertility rate	3.16	0.232	2,577	1,537	2.93	0.250	2,687	1,706	2.96	0.245	2,669	1,800	3.12	0.231	2,608	1,889
Under-five mortality rate	24.55	4.461	918	535	33.27	6.584	951	584	25.63	5.635	908	587	20.39	5.843	884	651
Cajamarca																
Currently using a modern method	0.44	0.025	617	801	0.48	0.031	562	708	0.47	0.026	520	636	0.46	0.029	581	733
Medically assisted delivery	0.65	0.044	437	562	0.66	0.047	415	517	0.68	0.042	356	434	0.70	0.045	398	503
Fully immunized	0.46	0.073	72	93	0.59	0.069	83	103	0.66	0.061	84	105	0.79	0.045	84	106
Height-for-age below -2 SD	0.40	0.033	420	570	0.41	0.028	423	547	0.33	0.041	355	458	0.35	0.037	393	521
Total fertility rate	3.25	0.243	2,657	3,464	3.03	0.234	2,652	3,381	2.87	0.208	2,382	2,940	3.00	0.264	2,553	3,229
Under-five mortality rate	37.25	8.470	861	1,096	21.01	5.842	877	1,103	33.64	6.081	730	890	39.16	8.032	796	1,000

(Continued...)

Appendix Table 1. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)
Callao																
Currently using a modern method	0.56	0.053	115	364	0.61	0.035	124	384	0.52	0.067	124	368	0.62	0.043	140	395
Medically assisted delivery	0.99	0.011	80	255	1.00	0.000	76	236	0.99	0.010	85	260	1.00	0.000	82	234
Fully immunized	0.67	0.171	9	29	0.46	0.094	20	63	0.86	0.072	21	62	0.61	0.126	12	34
Height-for-age below -2 SD	0.06	0.030	66	215	0.12	0.037	68	215	0.04	0.025	83	261	0.02	0.015	81	233
Total fertility rate	2.18	0.307	669	2,129	2.68	0.476	612	1,899	2.73	0.340	706	2,091	2.01	0.245	789	2,233
Under-five mortality rate	13.36	9.374	157	499	21.18	14.818	151	467	12.77	8.885	149	452	14.49	8.396	174	502
Cusco																
Currently using a modern method	0.41	0.025	481	519	0.41	0.027	577	641	0.47	0.029	501	609	0.49	0.027	514	605
Medically assisted delivery	0.79	0.047	334	364	0.82	0.039	378	413	0.86	0.035	335	392	0.94	0.018	266	315
Fully immunized	0.46	0.058	66	71	0.69	0.055	75	81	0.82	0.045	68	81	0.80	0.053	54	66
Height-for-age below -2 SD	0.38	0.047	313	360	0.33	0.029	359	404	0.27	0.037	331	407	0.21	0.034	268	338
Total fertility rate	2.90	0.271	2,166	2,323	3.03	0.263	2,543	2,800	2.99	0.251	2,182	2,670	2.27	0.189	2,273	2,679
Under-five mortality rate	36.57	8.111	730	803	35.78	7.098	807	885	51.03	9.314	733	838	26.42	7.116	639	750
Huancavelica																
Currently using a modern method	0.37	0.045	468	273	0.38	0.029	427	244	0.38	0.030	463	250	0.42	0.036	470	223
Medically assisted delivery	0.71	0.044	400	222	0.78	0.035	336	195	0.77	0.036	355	189	0.82	0.035	352	164
Fully immunized	0.70	0.065	75	42	0.82	0.061	57	33	0.89	0.035	63	34	0.79	0.056	76	34
Height-for-age below -2 SD	0.54	0.036	381	220	0.56	0.040	333	202	0.53	0.030	339	188	0.48	0.043	341	171
Total fertility rate	3.39	0.466	2,025	1,200	3.28	0.295	1,927	1,094	3.24	0.285	2,031	1,107	3.08	0.295	2,093	1,001
Under-five mortality rate	44.24	7.649	873	503	29.32	5.574	788	458	39.95	4.964	826	442	31.96	7.471	798	372
Huanuco																
Currently using a modern method	0.52	0.027	522	386	0.55	0.026	522	401	0.57	0.030	469	355	0.59	0.027	563	426
Medically assisted delivery	0.79	0.031	425	307	0.86	0.024	382	290	0.86	0.036	338	254	0.93	0.018	379	286
Fully immunized	0.65	0.063	74	53	0.59	0.059	64	49	0.62	0.063	63	48	0.79	0.057	72	52
Height-for-age below -2 SD	0.39	0.035	408	311	0.36	0.034	383	304	0.33	0.032	342	272	0.29	0.028	393	316
Total fertility rate	3.15	0.233	2,395	1,809	2.87	0.197	2,336	1,822	2.92	0.232	2,177	1,659	3.02	0.221	2,516	1,910
Under-five mortality rate	33.05	7.224	881	641	34.58	5.955	835	635	27.78	6.008	745	551	29.83	5.677	815	604
Ica																
Currently using a modern method	0.56	0.025	559	360	0.57	0.019	544	353	0.60	0.022	528	363	0.59	0.020	569	354
Medically assisted delivery	0.98	0.007	360	234	0.98	0.010	343	223	1.00	0.000	336	231	0.99	0.005	377	235
Fully immunized	0.56	0.065	67	42	0.57	0.066	69	45	0.64	0.062	75	50	0.70	0.059	70	44
Height-for-age below -2 SD	0.10	0.019	342	233	0.10	0.018	342	232	0.08	0.027	334	243	0.08	0.016	362	237
Total fertility rate	2.52	0.158	2,841	1,821	2.40	0.230	2,675	1,726	2.47	0.144	2,656	1,812	2.41	0.161	2,921	1,812
Under-five mortality rate	19.38	5.725	695	450	15.66	6.002	693	448	21.39	5.882	669	460	28.24	7.507	725	453

(Continued...)

Appendix Table 1. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)
Junin																
Currently using a modern method	0.45	0.024	546	613	0.48	0.029	546	607	0.50	0.027	554	624	0.48	0.028	529	581
Medically assisted delivery	0.70	0.044	399	449	0.75	0.055	362	393	0.84	0.053	336	377	0.85	0.035	306	337
Fully immunized	0.48	0.073	69	80	0.61	0.065	68	76	0.79	0.056	77	85	0.74	0.055	60	63
Height-for-age below -2 SD	0.34	0.034	386	451	0.27	0.036	367	414	0.27	0.040	330	393	0.22	0.022	315	367
Total fertility rate	2.64	0.221	2,544	2,877	2.53	0.251	2,638	2,982	2.50	0.201	2,585	2,944	2.23	0.177	2,581	2,838
Under-five mortality rate	32.27	7.085	801	893	30.17	6.169	764	841	18.77	4.220	759	848	28.25	6.083	677	736
La Libertad																
Currently using a modern method	0.46	0.023	610	816	0.50	0.024	542	687	0.47	0.027	490	629	0.51	0.029	562	801
Medically assisted delivery	0.75	0.049	414	543	0.83	0.035	403	501	0.77	0.051	354	451	0.85	0.034	421	577
Fully immunized	0.44	0.062	67	87	0.62	0.059	100	124	0.61	0.073	67	87	0.76	0.057	65	91
Height-for-age below -2 SD	0.27	0.037	373	512	0.25	0.030	382	493	0.21	0.030	351	472	0.21	0.027	412	597
Total fertility rate	2.47	0.181	2,996	4,040	2.96	0.209	2,678	3,413	2.51	0.203	2,515	3,278	2.62	0.236	2,841	3,848
Under-five mortality rate	41.28	9.829	824	1,088	26.08	6.497	799	971	16.91	7.253	713	906	14.78	4.605	817	1,137
Lambayeque																
Currently using a modern method	0.52	0.028	447	442	0.52	0.034	466	503	0.54	0.025	487	543	0.52	0.026	538	543
Medically assisted delivery	0.90	0.047	275	271	0.84	0.073	285	302	0.89	0.027	301	338	0.88	0.033	344	348
Fully immunized	0.40	0.066	51	50	0.69	0.109	54	56	0.57	0.056	59	70	0.73	0.073	69	68
Height-for-age below -2 SD	0.18	0.033	265	275	0.17	0.040	281	310	0.15	0.028	295	349	0.13	0.026	337	365
Total fertility rate	2.09	0.189	2,514	2,487	2.24	0.221	2,492	2,680	2.29	0.198	2,667	2,940	2.46	0.183	2,791	2,713
Under-five mortality rate	21.91	8.956	562	554	24.45	6.912	563	599	33.73	6.227	618	703	10.75	4.109	691	693
Lima																
Currently using a modern method	0.58	0.015	1,226	3,925	0.57	0.016	1,109	3,594	0.59	0.014	1,059	3,432	0.59	0.018	1,243	3,881
Medically assisted delivery	0.98	0.005	738	2,371	0.98	0.005	626	1,999	0.99	0.005	676	2,189	0.97	0.009	728	2,252
Fully immunized	0.52	0.046	128	413	0.53	0.045	129	414	0.75	0.035	141	443	0.76	0.038	149	458
Height-for-age below -2 SD	0.09	0.012	653	2,161	0.09	0.012	601	1,956	0.07	0.013	664	2,196	0.06	0.009	685	2,103
Total fertility rate	2.16	0.107	6,877	21,856	1.93	0.098	6,045	19,675	2.13	0.121	6,031	19,666	2.11	0.091	7,093	21,871
Under-five mortality rate	14.00	3.251	1,451	4,667	16.14	4.410	1,300	4,169	13.84	3.795	1,328	4,287	17.30	3.705	1,475	4,594
Loreto																
Currently using a modern method	0.45	0.024	658	500	0.46	0.028	549	431	0.46	0.027	566	422	0.45	0.022	667	504
Medically assisted delivery	0.53	0.031	632	478	0.49	0.039	538	434	0.53	0.040	566	421	0.61	0.037	638	482
Fully immunized	0.42	0.055	112	84	0.54	0.077	129	102	0.64	0.061	96	72	0.65	0.052	137	106
Height-for-age below -2 SD	0.29	0.027	611	486	0.33	0.033	544	452	0.35	0.027	553	435	0.30	0.022	630	506
Total fertility rate	3.86	0.272	2,928	2,228	4.29	0.362	2,440	1,895	4.58	0.370	2,425	1,813	4.29	0.283	2,792	2,097
Under-five mortality rate	63.66	8.559	1,156	874	57.20	9.769	1,006	810	45.01	6.812	1,094	811	50.73	6.989	1,249	940

(Continued...)

Appendix Table 1. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)
Madre de Dios																
Currently using a modern method	0.50	0.024	723	65	0.50	0.023	605	60	0.56	0.022	690	79	0.55	0.021	618	79
Medically assisted delivery	0.91	0.019	529	48	0.90	0.024	391	40	0.93	0.019	477	55	0.94	0.018	443	56
Fully immunized	0.32	0.046	101	9	0.50	0.055	76	8	0.53	0.062	96	11	0.62	0.049	91	12
Height-for-age below -2 SD	0.13	0.015	513	49	0.11	0.017	376	39	0.12	0.014	464	55	0.12	0.016	436	58
Total fertility rate	3.11	0.187	3,112	276	2.98	0.198	2,619	259	2.88	0.179	2,954	343	2.93	0.165	2,623	332
Under-five mortality rate	30.84	6.371	980	89	31.47	8.656	806	82	37.75	6.631	948	108	37.26	7.985	894	114
Moquegua																
Currently using a modern method	0.52	0.023	540	106	0.62	0.027	479	89	0.57	0.029	436	77	0.55	0.027	416	76
Medically assisted delivery	0.97	0.012	304	61	0.96	0.019	287	53	0.97	0.010	214	38	0.96	0.023	221	41
Fully immunized	0.71	0.057	66	13	0.61	0.071	64	12	0.82	0.060	41	7	0.81	0.065	48	9
Height-for-age below -2 SD	0.05	0.015	280	58	0.06	0.017	277	53	0.05	0.016	208	38	0.04	0.013	220	42
Total fertility rate	2.48	0.141	2,464	494	2.43	0.160	2,260	421	1.97	0.132	2,041	365	2.12	0.198	2,096	386
Under-five mortality rate	37.16	8.528	556	111	21.93	6.276	565	105	27.12	7.093	459	81	14.57	6.293	441	81
Pasco																
Currently using a modern method	0.57	0.024	689	148	0.57	0.026	563	125	0.56	0.024	552	122	0.57	0.023	604	142
Medically assisted delivery	0.81	0.035	506	109	0.86	0.036	382	87	0.88	0.040	389	86	0.89	0.036	436	101
Fully immunized	0.36	0.064	90	19	0.60	0.066	67	16	0.79	0.048	79	17	0.72	0.040	78	18
Height-for-age below -2 SD	0.38	0.034	447	103	0.26	0.027	374	89	0.24	0.030	380	89	0.28	0.037	440	108
Total fertility rate	3.03	0.220	3,100	665	2.80	0.167	2,654	595	2.96	0.247	2,503	555	3.17	0.271	2,696	624
Under-five mortality rate	37.05	5.683	948	206	32.90	6.893	759	172	28.23	7.920	755	166	34.54	6.556	899	212
Piura																
Currently using a modern method	0.53	0.029	675	862	0.57	0.025	664	814	0.54	0.027	639	757	0.55	0.034	682	839
Medically assisted delivery	0.86	0.029	458	584	0.86	0.037	447	540	0.79	0.044	457	531	0.81	0.030	504	615
Fully immunized	0.48	0.068	74	95	0.59	0.061	93	113	0.62	0.061	83	97	0.76	0.060	95	120
Height-for-age below -2 SD	0.23	0.032	451	600	0.23	0.029	457	575	0.19	0.028	449	555	0.24	0.030	500	646
Total fertility rate	2.92	0.186	3,153	4,022	2.78	0.193	3,122	3,867	2.95	0.210	3,103	3,700	2.89	0.177	3,337	4,095
Under-five mortality rate	31.07	6.620	906	1,150	27.72	5.229	935	1,133	26.27	6.616	907	1,062	22.98	5.489	993	1,221
Puno																
Currently using a modern method	0.25	0.022	668	788	0.25	0.020	578	677	0.26	0.024	583	625	0.24	0.021	578	595
Medically assisted delivery	0.64	0.041	419	504	0.76	0.027	347	405	0.77	0.036	363	388	0.76	0.035	346	350
Fully immunized	0.49	0.061	67	82	0.47	0.056	77	92	0.67	0.052	78	81	0.64	0.070	63	66
Height-for-age below -2 SD	0.27	0.032	419	533	0.23	0.026	352	433	0.20	0.022	351	395	0.21	0.027	356	377
Total fertility rate	2.53	0.216	3,027	3,577	2.65	0.229	2,682	3,163	2.69	0.140	2,533	2,768	2.64	0.187	2,631	2,673
Under-five mortality rate	60.53	7.584	925	1,108	43.10	7.642	776	904	60.57	10.261	810	875	50.34	7.567	778	781

(Continued...)

Appendix Table 1. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)
San Martin																
Currently using a modern method	0.51	0.024	589	429	0.48	0.025	604	432	0.54	0.024	560	373	0.49	0.025	624	446
Medically assisted delivery	0.66	0.046	418	294	0.78	0.038	416	298	0.78	0.038	355	239	0.86	0.024	433	310
Fully immunized	0.65	0.064	81	56	0.57	0.068	75	52	0.70	0.058	81	54	0.81	0.043	95	66
Height-for-age below -2 SD	0.28	0.024	420	308	0.25	0.026	408	308	0.20	0.023	360	258	0.14	0.019	422	321
Total fertility rate	3.20	0.278	2,284	1,689	2.96	0.267	2,501	1,805	2.99	0.233	2,370	1,601	3.13	0.241	2,504	1,866
Under-five mortality rate	37.01	7.468	830	590	38.62	5.920	815	572	30.25	6.136	745	495	27.06	5.878	870	619
Currently using a modern method	0.52	0.027	460	183	0.46	0.027	398	146	0.46	0.027	377	138	0.48	0.031	423	158
Tacna																
Medically assisted delivery	0.95	0.016	259	105	0.95	0.021	190	70	0.95	0.022	214	81	0.98	0.008	245	93
Fully immunized	0.53	0.076	48	20	0.60	0.064	52	19	0.67	0.082	35	13	0.70	0.067	47	18
Height-for-age below -2 SD	0.02	0.011	183	77	0.04	0.014	194	73	0.04	0.011	210	82	0.03	0.009	244	96
Total fertility rate	2.32	0.150	2,288	907	1.86	0.178	2,030	748	1.77	0.173	2,056	757	2.08	0.176	2,269	830
Under-five mortality rate	35.48	10.247	527	211	12.52	5.056	419	154	8.46	4.231	429	159	21.31	7.105	494	187
Tumbes																
Currently using a modern method	0.67	0.022	590	121	0.68	0.017	548	112	0.65	0.024	550	115	0.65	0.016	577	122
Medically assisted delivery	0.95	0.015	380	79	0.96	0.025	336	69	0.95	0.028	354	74	0.98	0.010	388	84
Fully immunized	0.68	0.049	74	15	0.70	0.053	72	15	0.74	0.052	80	17	0.77	0.053	74	15
Height-for-age below -2 SD	0.14	0.021	382	83	0.12	0.018	331	72	0.10	0.022	350	76	0.10	0.017	380	88
Total fertility rate	2.78	0.139	2,644	540	2.68	0.210	2,461	501	3.17	0.229	2,370	494	3.14	0.201	2,634	545
Under-five mortality rate	23.82	5.638	713	147	28.39	6.780	646	133	23.08	5.703	683	143	25.37	5.414	737	161
Ucayali																
Currently using a modern method	0.50	0.024	602	216	0.48	0.027	558	209	0.53	0.024	550	207	0.52	0.029	591	207
Medically assisted delivery	0.62	0.045	534	191	0.69	0.051	457	170	0.74	0.037	427	160	0.79	0.039	472	163
Fully immunized	0.57	0.067	95	34	0.57	0.063	94	35	0.65	0.057	80	30	0.60	0.062	82	28
Height-for-age below -2 SD	0.30	0.026	524	201	0.34	0.028	470	185	0.30	0.026	431	172	0.20	0.024	495	181
Total fertility rate	4.10	0.281	2,548	915	3.34	0.259	2,519	949	3.29	0.250	2,432	916	3.45	0.217	2,610	915
Under-five mortality rate	38.04	8.151	943	336	46.14	7.066	919	342	25.36	7.001	816	307	29.10	5.958	954	330

Note:

Currently using modern method = Percentage of currently married women age 15-49 using a modern contraceptive method

Medically assisted delivery = Percentage of births in the five-year period before the survey assisted at delivery by a skilled attendant

Fully immunized = Percentage of children age 12-23 months who have received a BCG vaccination, three doses of DPT and polio vaccines and a measles vaccination

Height-for-age below -2 SD = Percentage of children under age 5 stunted, i.e., whose height-for-age is two or more standard deviations below the WHO Child Growth reference population median

Total fertility rate = Number of children a woman would bear by the end of her childbearing years if she were to bear children during those years at the age-specific fertility rates observed during the three-year period before the survey

Under-five mortality rate = probability of dying before the fifth birthday during the five-year period before the survey

Appendix Table 2. Result of tests of significance of differences between the 2009-2012 Peru Continuous Survey (CS) cycles for selected indicators, by urban-rural residence and department

	2010 CS vs. 2009 CS		2011 CS vs. 2010 CS		2012 CS vs. 2011 CS		2011 CS vs. 2009 CS		2012 CS vs. 2009 CS	
	Difference	Significant (95%)	Difference	Significant (95%)	Difference	Significant (95%)	Difference	Significant (95%)	Difference	Significant (95%)
Peru										
Currently using a modern method	0.01		0.01		0.01		0.01		0.02	+
Medically assisted delivery	0.03	+	0.01		0.02		0.04	+	0.05	+
Fully immunized	0.07	+	0.12	+	0.03		0.20	+	0.23	+
Height-for-age below -2 SD	0.00		-0.04	-	-0.01		-0.04	-	-0.06	-
Total fertility rate	-0.08		0.06		-0.03		-0.02		-0.05	
Under-five mortality rate	-2.89		-1.63		-0.11		-4.52		-4.63	
Urban-rural residence										
Urban										
Currently using a modern method	0.00		0.01		0.01		0.01		0.02	
Medically assisted delivery	0.01		0.01		0.00		0.02	+	0.02	+
Fully immunized	0.06	+	0.15	+	0.01		0.21	+	0.22	+
Height-for-age below -2 SD	0.00		-0.04	-	0.00		-0.04	-	-0.04	-
Total fertility rate	-0.09		0.10		-0.02		0.01		-0.01	
Under-five mortality rate	-0.32		-3.43		2.95		-3.75		-0.80	
Rural										
Currently using a modern method	0.01		0.01		0.01		0.02		0.02	
Medically assisted delivery	0.06	+	0.00		0.04		0.06	+	0.11	+
Fully immunized	0.09	+	0.08	+	0.06		0.18	+	0.24	+
Height-for-age below -2 SD	-0.02		-0.02		-0.05	-	-0.03		-0.08	-
Total fertility rate	-0.10		0.00		-0.05		-0.10		-0.16	
Under-five mortality rate	-9.49	-	2.63		-6.60		-6.86		-13.46	-
Department										
Amazonas										
Currently using a modern method	-0.06		-0.01		-0.01		-0.06		-0.07	
Medically assisted delivery	0.15	+	-0.16	-	0.05		-0.01		0.04	
Fully immunized	0.01		-0.07		0.07		-0.05		0.02	
Height-for-age below -2 SD	-0.03		0.08	+	-0.04		0.05		0.01	
Total fertility rate	-0.29		0.55		-0.04		0.26		0.22	
Under-five mortality rate	4.36		-4.15		-10.27		0.22		-10.05	

(Continued...)

Appendix Table 2. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Unweighted number (N)	Weighted number (WN)
Ancash																
Currently using a modern method			0.03			-0.03		0.02				0.00			0.02	
Medically assisted delivery			0.07			0.00		0.00				0.07			0.07	
Fully immunized			0.03			0.06		0.13				0.09			0.22	+
Height-for-age below -2 SD			0.01			-0.04		-0.01				-0.03			-0.04	
Total fertility rate			-0.39			0.40	+	0.06				0.01			0.08	
Under-five mortality rate			-5.69			-3.55		11.43				-9.24			2.20	
Apurimac																
Currently using a modern method			-0.02			0.01		0.02				-0.01			0.02	
Medically assisted delivery			0.04	+		-0.02		0.02				0.03			0.04	+
Fully immunized			0.30	+		0.01		0.03				0.31	+		0.34	+
Height-for-age below -2 SD			0.07			-0.06		-0.08				0.01			-0.07	
Total fertility rate			-0.16			-0.35		-0.03				-0.51			-0.54	
Under-five mortality rate			0.57			-8.67		9.03				-8.10			0.93	
Arequipa																
Currently using a modern method			-0.08	-		-0.02		0.07		+		-0.10	-		-0.03	
Medically assisted delivery			0.01			0.01		-0.03				0.03			0.00	
Fully immunized			0.22	+		0.12		-0.08				0.33	+		0.25	+
Height-for-age below -2 SD			0.00			-0.07	-	0.04				-0.07	-		-0.03	
Total fertility rate			-0.12			0.06		0.22				-0.06			0.16	
Under-five mortality rate			-16.44			-5.14		3.07				-21.58	-		-18.51	-
Ayacucho																
Currently using a modern method			0.01			0.03		0.01				0.04			0.05	
Medically assisted delivery			-0.02			0.00		0.03				-0.02			0.00	
Fully immunized			0.10			0.11		-0.11				0.21	+		0.10	
Height-for-age below -2 SD			-0.05			-0.03		-0.08				-0.08	-		-0.16	-
Total fertility rate			-0.23			0.04		0.16				-0.20			-0.04	
Under-five mortality rate			8.72			-7.64		-5.24				1.08			-4.16	
Cajamarca																
Currently using a modern method			0.04			-0.01		-0.01				0.03			0.02	
Medically assisted delivery			0.01			0.02		0.02				0.03			0.05	
Fully immunized			0.14			0.07		0.13				0.21	+		0.33	+
Height-for-age below -2 SD			0.02			-0.08	-	0.02				-0.07			-0.05	
Total fertility rate			-0.22			-0.16		0.13				-0.38			-0.25	
Under-five mortality rate			-16.24			12.64		5.51				-3.61			1.91	

(Continued...)

Appendix Table 2. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Stan-dard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Stan-dard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Stan-dard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Stan-dard error (SE)	Un-weighted number (N)	Weighted number (WN)
Callao																
Currently using a modern method			0.04			-0.09		0.10				-0.04			0.06	
Medically assisted delivery			0.01			-0.01		0.01				0.00			0.01	
Fully immunized			-0.21			0.40	+	-0.25				0.19			-0.07	
Height-for-age below -2 SD			0.06			-0.08		-0.02				-0.02			-0.04	
Total fertility rate			0.49			0.05		-0.72				0.55			-0.17	
Under-five mortality rate			7.82			-8.41		1.72				-0.59			1.13	
Cusco																
Currently using a modern method			0.01			0.05		0.03				0.06			0.09	+
Medically assisted delivery			0.03			0.04		0.08		+		0.06			0.15	+
Fully immunized			0.23	+		0.13		-0.02				0.36	+		0.34	+
Height-for-age below -2 SD			-0.06			-0.05		-0.07				-0.11			-0.18	-
Total fertility rate			0.13			-0.04		-0.72		-		0.09			-0.63	
Under-five mortality rate			-0.79			15.26		-24.62		-		14.47			-10.15	
Huancavelica																
Currently using a modern method			0.00			0.01		0.04				0.01			0.04	
Medically assisted delivery			0.08			-0.01		0.05				0.07			0.11	+
Fully immunized			0.12			0.07		-0.09				0.19	+		0.10	
Height-for-age below -2 SD			0.02			-0.03		-0.05				-0.01			-0.06	
Total fertility rate			-0.12			-0.03		-0.17				-0.15			-0.32	
Under-five mortality rate			-14.92			10.63		-7.99				-4.29			-12.28	
Huanuco																
Currently using a modern method			0.03			0.01		0.02				0.04			0.07	
Medically assisted delivery			0.07	+		-0.01		0.08				0.07			0.14	+
Fully immunized			-0.05			0.02		0.17		+		-0.03			0.14	
Height-for-age below -2 SD			-0.04			-0.02		-0.04				-0.06			-0.10	-
Total fertility rate			-0.29			0.05		0.11				-0.24			-0.13	
Under-five mortality rate			1.53			-6.80		2.05				-5.27			-3.22	
Ica																
Currently using a modern method			0.01			0.03		-0.01				0.04			0.03	
Medically assisted delivery			0.00			0.02	+	-0.01				0.02	+		0.01	
Fully immunized			0.01			0.07		0.06				0.08			0.14	
Height-for-age below -2 SD			0.00			-0.03		0.00				-0.03			-0.02	
Total fertility rate			-0.12			0.07		-0.05				-0.05			-0.10	
Under-five mortality rate			-3.72			5.73		6.85				2.01			8.86	

(Continued...)

Appendix Table 2. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)
Junin																
Currently using a modern method			0.03		0.02			-0.02				0.05			0.03	
Medically assisted delivery			0.05	+	0.09			0.01				0.14	+		0.14	+
Fully immunized			0.13		0.18		+	-0.05				0.30	+		0.26	+
Height-for-age below -2 SD			-0.07		0.00			-0.05				-0.07			-0.12	-
Total fertility rate			-0.10		-0.04			-0.27				-0.14			-0.40	
Under-five mortality rate			-2.10		-11.40			9.48				-13.50			-4.02	
La Libertad																
Currently using a modern method			0.04		-0.03			0.04				0.02			0.05	
Medically assisted delivery			0.08		-0.07			0.09				0.02			0.10	
Fully immunized			0.19	+	-0.02			0.15				0.17			0.32	+
Height-for-age below -2 SD			-0.02		-0.04			0.00				-0.06			-0.07	
Total fertility rate			0.49		-0.45			0.11				0.04			0.15	
Under-five mortality rate			-15.20		-9.17			-2.13				-24.37	-		-26.50	-
Lambayeque																
Currently using a modern method			0.00		0.02			-0.02				0.01			-0.01	
Medically assisted delivery			-0.06		0.05			-0.01				-0.01			-0.02	
Fully immunized			0.28	+	-0.11			0.16				0.17	+		0.33	+
Height-for-age below -2 SD			-0.01		-0.02			-0.02				-0.03			-0.05	
Total fertility rate			0.16		0.05			0.17				0.20			0.37	
Under-five mortality rate			2.54		9.28			-22.98		-		11.82			-11.16	
Lima																
Currently using a modern method			-0.01		0.02			0.00				0.01			0.01	
Medically assisted delivery			0.01		0.00			-0.01				0.01			-0.01	
Fully immunized			0.01		0.22		+	0.01				0.23	+		0.24	+
Height-for-age below -2 SD			0.00		-0.02			-0.01				-0.02			-0.03	
Total fertility rate			-0.23		0.20			-0.02				-0.03			-0.05	
Under-five mortality rate			2.14		-2.30			3.45				-0.16			3.30	
Loreto																
Currently using a modern method			0.01		0.01			-0.01				0.02			0.01	
Medically assisted delivery			-0.04		0.04			0.08				0.00			0.09	
Fully immunized			0.12		0.10			0.01				0.22	+		0.23	+
Height-for-age below -2 SD			0.04		0.02			-0.06				0.06			0.01	
Total fertility rate			0.43		0.29			-0.29				0.72			0.43	
Under-five mortality rate			-6.47		-12.19			5.72				-18.65			-12.93	

(Continued...)

Appendix Table 2. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)	Value (R)	Standard error (SE)	Un-weighted number (N)	Weighted number (WN)
Madre de Dios																
Currently using a modern method			0.00			0.05		-0.01				0.06			0.05	
Medically assisted delivery			-0.01			0.03		0.01				0.02			0.03	
Fully immunized			0.18	+		0.03		0.10				0.21	+		0.30	+
Height-for-age below -2 SD			-0.01			0.01		0.00				0.00			-0.01	
Total fertility rate			-0.13			-0.09		0.04				-0.23			-0.18	
Under-five mortality rate			0.63			6.28		-0.50				6.91			6.42	
Moquegua																
Currently using a modern method			0.09	+		-0.05		-0.02				0.05			0.02	
Medically assisted delivery			-0.01			0.01		-0.02				0.00			-0.02	
Fully immunized			-0.10			0.21	+	-0.01				0.11			0.10	
Height-for-age below -2 SD			0.01			-0.02		-0.01				0.00			-0.01	
Total fertility rate			-0.05			-0.46	-	0.16				-0.51	-		-0.35	
Under-five mortality rate			-15.23			5.19		-12.55				-10.04			-22.59	-
Pasco																
Currently using a modern method			-0.01			-0.01		0.01				-0.01			0.00	
Medically assisted delivery			0.05			0.02		0.01				0.07			0.08	
Fully immunized			0.24	+		0.19	+	-0.07				0.43	+		0.36	+
Height-for-age below -2 SD			-0.13	-		-0.02		0.04				-0.15	-		-0.10	-
Total fertility rate			-0.23			0.16		0.22				-0.08			0.14	
Under-five mortality rate			-4.15			-4.67		6.31				-8.82			-2.51	
Piura																
Currently using a modern method			0.04			-0.03		0.01				0.01			0.03	
Medically assisted delivery			0.00			-0.06		0.02				-0.06			-0.05	
Fully immunized			0.11			0.04		0.14				0.15			0.28	+
Height-for-age below -2 SD			0.00			-0.04		0.05				-0.04			0.01	
Total fertility rate			-0.14			0.17		-0.06				0.03			-0.03	
Under-five mortality rate			-3.35			-1.44		-3.30				-4.80			-8.09	
Puno																
Currently using a modern method			0.00			0.01		-0.02				0.01			-0.01	
Medically assisted delivery			0.12	+		0.02		-0.01				0.13	+		0.12	+
Fully immunized			-0.02			0.20	+	-0.03				0.18	+		0.15	
Height-for-age below -2 SD			-0.04			-0.04		0.01				-0.08	-		-0.07	
Total fertility rate			0.12			0.04		-0.05				0.16			0.11	
Under-five mortality rate			-17.43	-		17.47		-10.23				0.04			-10.18	

(Continued...)

Appendix Table 2. – *Continued*

	CS 2009				CS 2010				CS 2011				CS 2012			
	Value	Stan-dard error	Un-weighted number	Weighted number	Value	Stan-dard error	Un-weighted number	Weighted number	Value	Stan-dard error	Un-weighted number	Weighted number	Value	Stan-dard error	Un-weighted number	Weighted number
	(R)	(SE)	(N)	(WN)	(R)	(SE)	(N)	(WN)	(R)	(SE)	(N)	(WN)	(R)	(SE)	(N)	(WN)
San Martin																
Currently using a modern method			-0.03			0.06	+	-0.05				0.03			-0.02	
Medically assisted delivery			0.12	+		0.00		0.08				0.12	+		0.20	+
Fully immunized			-0.08			0.13		0.11				0.05			0.16	+
Height-for-age below -2 SD			-0.03			-0.06		-0.05				-0.09	-		-0.14	-
Total fertility rate			-0.24			0.04		0.14				-0.21			-0.06	
Under-five mortality rate			1.62			-8.38		-3.19				-6.76			-9.95	
Tacna																
Currently using a modern method			-0.06			0.00		0.02				-0.07			-0.04	
Medically assisted delivery			0.00			0.00		0.03				0.00			0.03	
Fully immunized			0.07			0.07		0.03				0.14			0.17	
Height-for-age below -2 SD			0.02			0.00		-0.01				0.02			0.01	
Total fertility rate			-0.46			-0.09		0.32				-0.55	-		-0.24	
Under-five mortality rate			-22.96			-4.06		12.85				-27.02	-		-14.17	
Tumbes																
Currently using a modern method			0.01			-0.03		0.00				-0.03			-0.02	
Medically assisted delivery			0.01			-0.01		0.03				0.00			0.03	
Fully immunized			0.02			0.04		0.03				0.06			0.09	
Height-for-age below -2 SD			-0.01			-0.02		0.00				-0.03			-0.03	
Total fertility rate			-0.10			0.49		-0.03				0.39			0.35	
Under-five mortality rate			4.56			-5.31		2.29				-0.74			1.55	
Ucayali																
Currently using a modern method			-0.02			0.06		-0.01				0.04			0.02	
Medically assisted delivery			0.06			0.05		0.05				0.12	+		0.16	+
Fully immunized			0.00			0.08		-0.05				0.09			0.03	
Height-for-age below -2 SD			0.04			-0.04		-0.09		-		0.00			-0.10	-
Total fertility rate			-0.76	-		-0.05		0.15				-0.81	-		-0.65	
Under-five mortality rate			8.09			-20.77	-	3.73				-12.68			-8.94	

Note:

Currently using modern method = Percentage of currently married women age 15-49 using a modern contraceptive method

Medically assisted delivery = Percentage of births in the five-year period before the survey assisted at delivery by a skilled attendant

Fully immunized = Percentage of children age 12-23 months who have received a BCG vaccination, three doses of DPT and polio vaccines and a measles vaccination

Height-for-age below -2 SD = Percentage of children under age 5 stunted, i.e., whose height-for-age is two or more standard deviations below the WHO Child Growth reference population median

Total fertility rate = Number of children a woman would bear by the end of her childbearing years if she were to bear children during those years at the age-specific fertility rates observed during the three-year period before the survey

Under-five mortality rate = probability of dying before the fifth birthday during the five-year period before the survey