Chapter 4. The structural quality of health services as a potential constraint for human capital accumulation

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6.1 Abstract

One key assumption underlying interventions and policies aiming to promote development by increasing the accumulation of human capital, particularly health capital, is that increasing access to and utilisation of health services will translate into health capital. This assumption, from Grossman´s health capital model, assumes that both preventive and curative health services improve health status and thus increase its level. The ability of health services to generate health is related to their quality. In terms of analysing the quality of health services, structural quality could be viewed as a necessary but not sufficient component of quality; having areas, equipment, supplies and medicine to offer health services is a requirement to offer care, and thus, analysing structural quality provides a basic measure of the ability of health services to effectively generate health. While there is an important amount of literature regarding quality of health services, empirical analysis of structural quality are limited as are those related this dimension of quality and outcome indicators. In this chapter, I present the first published analysis on structural quality of primary health services in Mexico and show large heterogeneity in structural quality that is negatively correlated with general living conditions, meaning that the poorest are served by the lowest level of structural quality facilities, and some indication that poor quality is related to higher infant mortality rate. Improving structural quality is required if development is sought.

Key words: structural quality, primary health care, Mexico, Oportunidades

JEL I10, I38, L15

6.2 Background

The quality of health services is a necessary condition for the production of health, assuming that health services are available. To promote positive social mobility and development, most of the focus on social development policies and programs has been on increasing the use of services by those most in need, that is, individuals with significant resource constraints; nevertheless, utilising health services is clearly only part of the equation to improve health status. (Powell-Jackson and Hanson)

Although improving health status is also related to individual background and non-health sector factors, such as access to public services (sanitation, for example) and living conditions, utilisation and quality are the key health service-related factors. Once individuals are in the health facilities, the services provided (preventive or curative) must be the best option for the specific health condition in order for the utilisation of health services to effectively translate into improved health status. In this sense, focusing on quality is essential in improving health outcomes. (Chassin, Galvin et al. 1998)

Among the potential dimensions of service quality, structural quality, that is, the means by which providers are able to deliver a service, is the basic setting needed for services to work. Analysing structural quality is a way of analysing the foundations of quality. (Gilson, Magomi et al. 1995; Ehiri, Oyo-Ita et al. 2005)

Understanding the structural quality of health services in the context of a programme that seeks to increase the demand for these services as an intervention to improve health should provide a measure of the programme's effectiveness. It could be argued that merely changing attitudes towards health care may produce positive results, as it increases the awareness of self-care and some health conditions; nevertheless, in terms of these outcomes the perception of how good these services are will affect trust in health providers, and one key element of this perception is how good these services are in providing health care.

Within the general approach of using health capital to promote socioeconomic mobility, the quality of health services plays an important role, as low quality could constitute a barrier to health capital accumulation. Investing in health services should lead to improvements in both quality and capacity. In countries where access to health services has improved, such as Mexico, reaching better outcomes is now related to better services, that is, to improved quality.

4.2.1. Health services quality

By quality, I refer to the characteristics of a good or a service that make it effective and that meet the needs or expectations of users. (Organización-Panamericana-de-la-Salud 1999) In the context of health services, quality has been discussed as a concept with complex and multidimensional elements, as it is associated with aspects of effectiveness, efficiency, scientific-technical know-how, management, perception, expectations, communication, conformity, coordination, accessibility, availability, distribution, satisfaction, privacy, credibility, professionalism, competitiveness, accreditation, structural support, and security (World-Health-Organization 2000; March and Prieto 2001).

Quality has been defined at the clinical level in terms of technical know-how and the ability to offer safe and effective treatment to ensure the well-being of the patient (Creel, Sass et al. 2002). The quality of medical care can also be defined as providing the treatment expected to maximise the well-being of a patient, after taking into consideration the expected consequences (cost and benefits) (Torres-Arreola and Constantino-Casas 2003). According to the American Medical Association (AMA), quality in healthcare is a level of care that consistently increases or maintains the quality and duration of life (Frenk 1993). The Institute of Medicine in the USA defined quality of care as

> "*the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (IOM 1990)*

4.2.2. Dimensions for the analysis of quality in healthcare: structure, process and outcomes

For practical purposes, all actions undertaken in health institutions are related to service quality, that is, the process through which a user receives care is embedded in a quality framework. However, due to heterogeneity in individuals and their health conditions, the evaluation of quality is a difficult task (IMSS 2006).

The analysis of quality of care may be framed from the perspective of providers, users, health organisations, and health financers (Torres-Arreola and Constantino-Casas 2003). It could be analysed through three interconnected components: medical care (medical know-how and technology used to maximise benefits in patient care while minimising implicit risks); interpersonal attention (psychosocial aspects of care, including the patient-provider relationship); and organisation (which determines accessibility, efficiency, etc.) (World-Health-Organization 2000).

Following Donabedian's framework for quality of care, three dimensions for the measurement of quality were identified based on a continuum of service provision: structure, processes, and results (Donabedian 1966; Donabedian 1984; Petiti and Amster 1998).

Structural quality refers to the characteristics of existing resources to provide health services. For staff, it includes characteristics such as specialty, certification, age, and gender. Regarding facilities, size and type are relevant, as well as physical attributes (equipment, supplies) and other factors or organisational indicators, such as the patient/physician ratio, organisational structure, budget distribution, and payment source (Donabedian 1966; Donabedian 1984; Quality and Medicine 1999).

Process quality refers to the specific care provided to the patient. It is divided into two aspects: technical excellence and interpersonal quality. From the perspective of health service providers, technical quality includes actions that guarantee the security, effectiveness, and utility of health treatment, as well as the

ability of providers to serve users in an effective and appropriate manner. Quality is defined in terms of the attributes and results of the care, which highlight the technical excellence and characteristics of the interaction between doctors and patients (Ross, Zeballos et al. 2000; World-Health-Organization 2004). Thus, technical quality is defined as the challenge of applying medical science and technology to provide health benefits (Ross, Zeballos et al. 2000; Torres-Arreola and Constantino-Casas 2003; World-Health-Organization 2004).

Finally, health outcomes are measured by the quality of life of the patients, their functional status, and their satisfaction after they have received care. Material, psychological, administrative, and ethical elements are taken into consideration to evaluate this area and to determine how health-related actions or interventions develop. The perspective of the patient is also taken into consideration, including his own preferences, values, and opinions about the medical care received. Therefore, quality is represented as the user's satisfaction with the care provided, regardless of the health outcomes of the treatment (morbidity, mortality, and functional status) (Ross, Zeballos et al. 2000; Torres-Arreola and Constantino-Casas 2003; World-Health-Organization 2004). Health outcomes are a product of the health and well-being of the community; in other words, they are a measurement of the effectiveness of the healthcare system.

Although attention to health has been considered a priority because it will improve the quality of life of marginal socio-economic populations, emphasis on the quality of services has only recently developed. Quality programs and policies have primarily been developed in hospitals, and only recently has emphasis also been placed on primary care (Organización-Panamericana-de-la-Salud 2001). Although the three dimensions of quality are all relevant, structural quality could be viewed as the foundation of quality in general, as the provision of health services requires a structure.

Several studies have shown that health services in developing countries do not offer appropriate solutions in the necessary proportions. According to a study in seven countries, among 75% of the cases reviewed, diagnostic or treatment

mistakes and erroneous monitoring of health problems frequently occurred. In more than half of the cases, incorrect use of antibiotics, as well as incorrect administration of fluids, oxygen, or food treatments, was recorded. Low service quality is not only related to access to resources, and more money does not ensure more efficiency or quality. Organisational changes are necessary to improve quality and to optimise the use of available resources (Massoud, Askov et al. 2001).

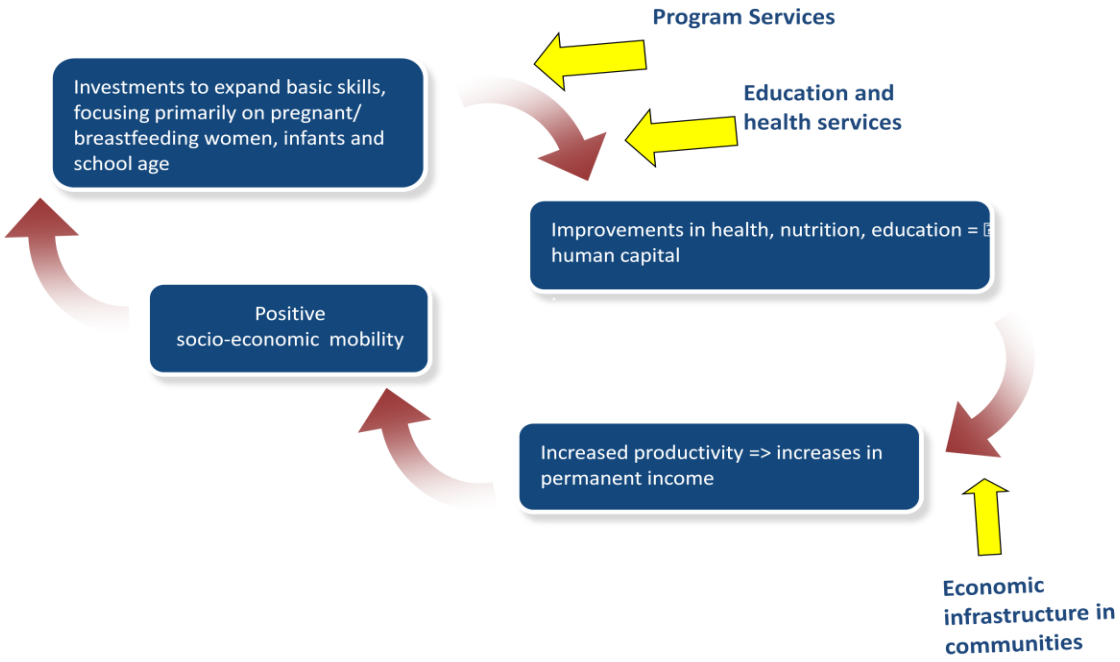
Research performed for The Bellagio Conference on Child Survival showed that approximately two-thirds of the 10 million child deaths that occur each year in low-income countries could be prevented by medical interventions that are feasible and available in today's medical world (Jones, Steketee et al. 2003). Other similar research articles note that the mechanisms used to implement medical interventions are deficient and that their use is inadequate, especially for the treatment of the low-income population (Bryce, el Arifeen et al. 2003; Victora, Wagstaff et al. 2003). The structure of health services presents an important challenge in ensuring the provision of adequate services.

Because of its multidimensionality and the lack of appropriate data, quality is difficult to measure. (McClellan and Staiger 1999) As different elements play a role in the final outcome (health status) and each individual health condition may require a specific approach, there is no single measure of quality in general. One advantage of analysing structural quality is that it refers to structures that are universally required, regardless of the specific patient.

For the analysis presented in this document, I used data from a survey evaluating Oportunidades, a Mexican CCT programme that seeks to contribute to the reduction of the intergenerational transmission of poverty and thereby promote positive social mobility and development. The overall approach to measure structural quality reported in this paper was developed first for a report to the programme on the quality of health services that are use by beneficiaries in rural areas. (Gutiérrez, Leroy et al. 2008) The program design seeks to incentivise the demand for health and education services among under-resourced households, which is expected to increase the accumulation of human capital (education and

health). As mentioned above, in order for these incentives to effectively generate more health and education capital, the services provided must be adequate, timely and relevant to the health condition (i.e., they must be quality services). As presented in figure 1, key assumptions in the theory behind Oportunidades, and in general CCT programmes, is that services are there and have an adequate level of quality.

Figure 1. How Oportunidades is supposed to contribute to interrupt the inter-generational transmission of poverty



The key finding from previous evaluations of the impacts of Oportunidades in health status is that positive effects are not as large as expected given the magnitude in the increases in health services utilization; the main hypothesis to explain this is related to the quality of health services: Oportunidades has been very effective in increasing utilization, but because services low-quality, this extra-utilization is producing less than potential health capital. (Angeles, Gutierrez et al. 2011) This conclusion regarding Oportunidades has been also described more in general for CCT programmes, reporting their unquestionable potential to increase utilization, but less clear effects on health outcomes. (Gaarder, Glassman et al. 2010)

The increase in health services utilization has been also documented using administrative data from the facilities; Bautista showed how an increase in the percentage of Oportunidades houholds in a locality is directly related to an important increase in the total number of consultation at the health facilities. (Bautista 2004)

Health services provided to the *Oportunidades* population are offered through different providers: the states´ Ministries of Health, facilities operated by the IMSS-*Oportunidades*, and a programme funded by Federal resources and managed by the Mexican Institute of Social Security (IMSS). The programme's procedures establish the contents of the health package. Households incorporated into the programme and utilising facilities operated by these institutions should have access to the same package of health services.

Because health services are operated by different providers, there is a potential for heterogeneity. Even assuming that access is not an issue, the quality of services can contribute to increased health quality and can also reflect and reinforce the inequality in access to health services. The available staff, their training, and their resources are areas in which equity considerations are important (Das and Gertler 2007). In this sense, state variations are expected also, because as health services in Mexico are des-centralized, each state has their own institutional arrangements and constitute a different provider.

The aim of this analysis is to measure the structural quality of primary health services that serve rural localities in Mexico and to analyse factors related to structural quality and how structural quality may affect health outcomes. For this analysis, I take advantage of the largest survey of primary health services in Mexico, which was collected within an evaluation of Oportunidades. The relevance of focus on structural quality is related to the fact that this is a necessary condition to provided adequate services.That is, as having a proper structure to function is a condition to provide adequate care, describing facilities in terms of structure allows to discuss if conditions exits to effectively translate utilization into health.

6.3 Methodology

6.2.1 Measurement of structure

To measure the structural dimension of quality, I lead a team that developed an instrument to gather data on how well the health facilities were equipped, supplied, and staffed. This instrument, similar to a verification list, was elaborated by considering the minimal requirements of a unit to provide primary care, based on previously used instruments and according to Mexican regulations for public health services. This instrument follows Donabedian definition of structural quality as well as the standard approach to it, in terms of percentage of adequacy. (Donabedian 1984; Berendes, Heywood et al. 2011)

The basis for this instrument was a version developed for a 2001 survey among similar facilities. The survey asks for the current stock of the areas/supplies/drugs and the number of units for each one. This list is filled out during a face-to-face interview with MDs or nurses in each facility. The information registered is that reported by the informant and was not verified, although the respondent usually provided the information after checking their stocks.

In terms of drugs, the list used included all medicines in the basic catalogue, a document that includes all drugs that are provided by the public health institutions in Mexico. This catalogue was complemented with vaccines.

In addition to this instrument, MDs, nurses and patients were interviewed. Although the information collected in those instruments was not focused on structural quality and was thus not part of this analysis in general, some variables were used, particularly staff characteristics and the variables required to generate the SE level of staff and households of users (patients).

The instrument also included information on whether the facilities were accredited by the federal MoH and whether the reported services were provided by the Seguro Popular programme, a large-scale insurance-type programme in Mexico that channels resources for health facilities equipment.

6.2.2 Data

The data analysed in this document were collected during the fall of 2007 as part of a survey evaluating Oportunidades, the Household Evaluation Survey 2007 (ENCEL 2007, for its initials in Spanish). To measure the quality of health services, a specific component was incorporated into the ENCEL 2007, to be administered at the health facilities assigned to the households in the sample. At the time of incorporation in Oportunidades, every household is assigned to a specific health facility; for the rural localities that were surveyed, localities either have only one health facility or none, in which case households are assigned to the nearest one, which is in a nearby locality within walking distance.

The component evaluating health services was conceptualised to include the information of all health units providing service to the population of the 767 communities included in the household sample. For several reasons, not every community in the sample was visited (mainly because of weather conditions), and the effective sample of localities was 733 (96% of the original sample).

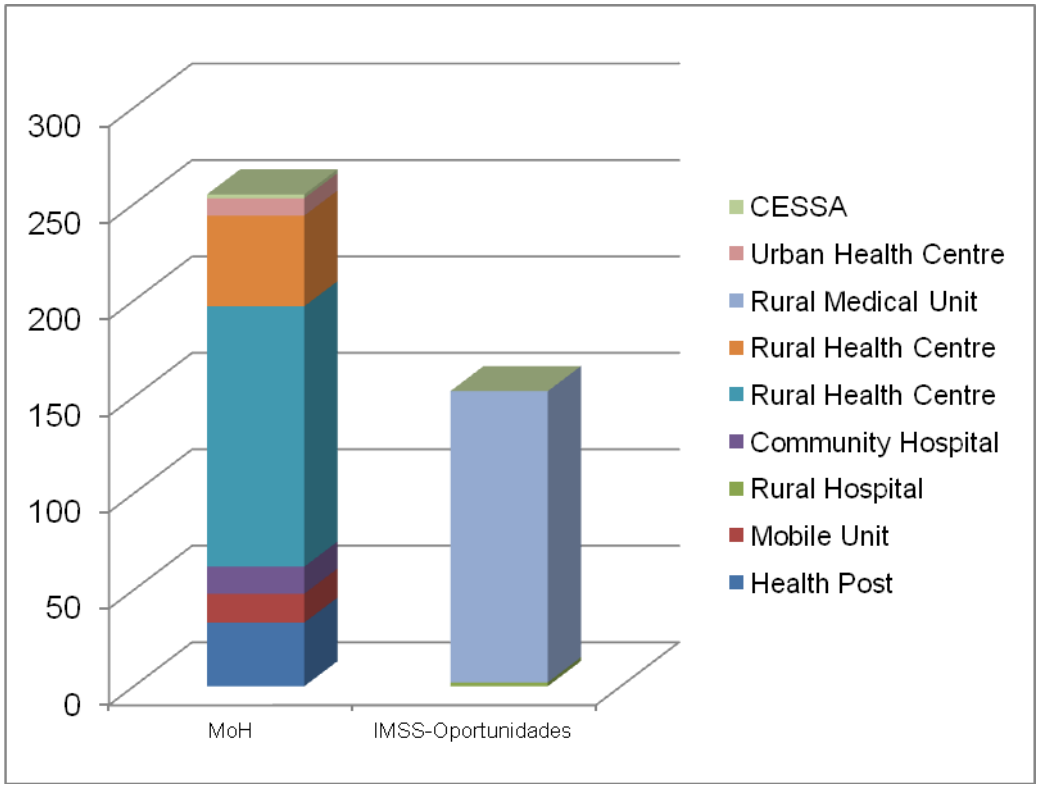
Data were obtained from 495 health facilities that served 591 localities (80% of those visited). It was not possible to obtain health service information from every community visited, as gaining access was difficult because providers refused to allow the survey team access. In other localities, there were logistical issues: the clinic was not in operation in the community during the days the team visited (a very frequent occurrence with mobile health units and also a problem with regular clinics). For the analysis reported here, data were available from 408 clinics (82% of the total visited) where complete structural data were obtained. The visited units are located in the 13 states included in the evaluation sample.

Although it is important to recognise the potential bias caused by a response rate of approximately 66% (80% of localities and 82% of facilities with structural data), it is important to note that this sample is the most complete measurement of health service quality at the primary care level in Mexico.

As shown in figure 7, most of the healthcare facilities in the sample were operated by the states´ Ministries of Health (MoHs) (64%), and 36% are part of the IMSS-Oportunidades (Rural Hospitals and Rural Medical Units). One very relevant aspect to consider is that states´ Ministries of Health are independent of each

other, and coordination from the Federal Ministry of Health is far from perfect; des-centralization of these services had result is having in fact 32 different providers plus IMSS-Oportunidades, each with specific organization and capacity to delivery care. As the type of provider may be an important determinant of quality, for the analysis, facilities were stratified in these two subsystems (states´ MoH and IMSS-Oportunidades facilities), even though it is important to keep in mind that the former are heterogeneous.

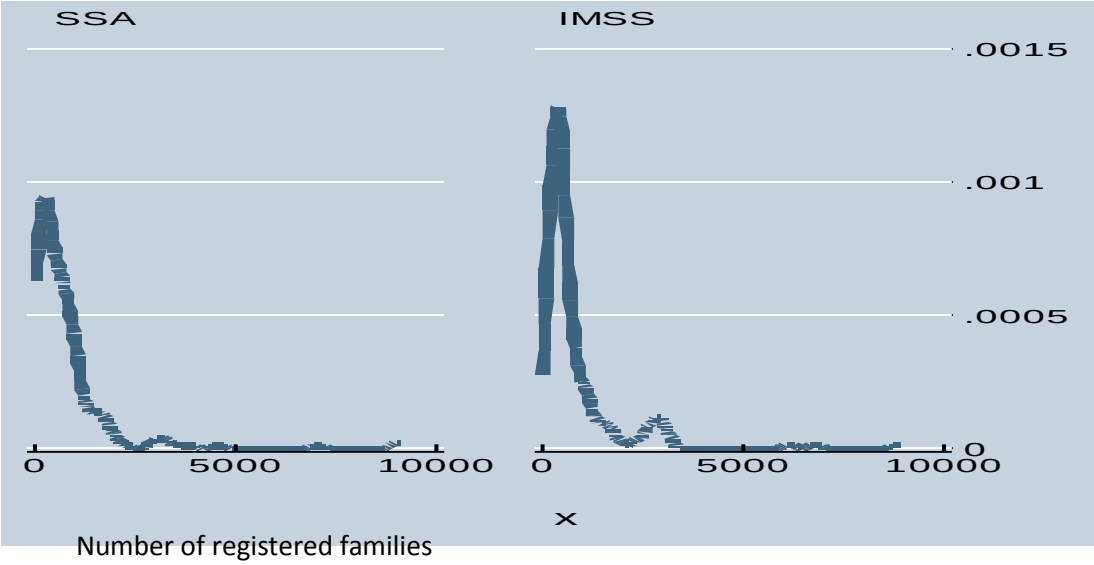
Figure 7: Distribution (n) of health facilities by type and provider



As a measure of size, the number of households that are registered at the facility was used. SSA units have a median of 500 families, with an interquartile

range from 206 to 986, while IMSS-Oportunidades units have a median of 450 families with an interquartile range of 316 to 838. Both, SSA & IMSS-Oportunides, comprise a heterogeneous set of facilities in terms of size, as it can be seen in the wide distribution shown in Figure 8. According to informants, 65% of the facilities reported providing service to the population affiliated with the *Seguro Popular* (even though only 60% could be identified in the listing of units providing service for *Seguro Popular*), but only 40% are accredited by the Federal MoH, which, in theory, is a requirement to provide services for the *Seguro Popular* (SP).

Figure 8: Distribution by number of registered families



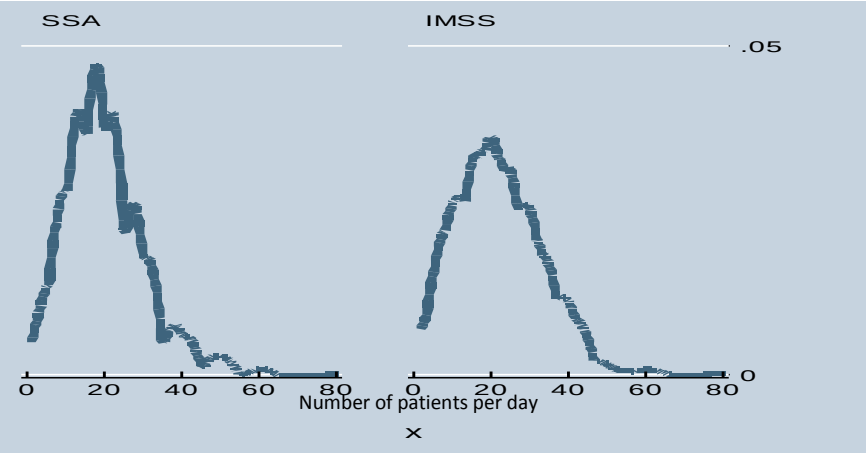
In terms of staffing, 42% of the facility's staff are medical doctors (most of them just graduated), and 36% are nurses (See Table 23). Of the 359 doctors interviewed, 46% were women, and 18% identified themselves as indigenous. The average age was 32 years old. Most of the physicians reported having attended a training course in the last year and were general practitioners (80%) who recently finished school (average of 4 years) and graduated recently (average of 3 years). Although MDs with long tenures at the facilities were interviewed, the average stay was less than a year (which is consistent with the fact that, for most of them, attending this facility is part of the social service requirement of the medical school). Approximately 15% of doctors reported having another job. According to the socioeconomic indicator developed (see below), 70% of the doctors were located in the 9th and 10th deciles (in contrast to the patients, who were located in the first two deciles). The nurses tended to have longer tenure at the facilities (average of 9 years), and the percentage of indigenous nurses was also higher (34%). The socioeconomic level of the nurses, located between deciles 7 and 10, was lower than that of MDs.

Table 23: Characteristics of unit personnel

	Doctors		Nurses			
	Mean	**SD**	**Mean**	**SD**	**P Value**	***n***
Sex (% men)	0.54		0.09		<0.001	*548*
Age (months)	32.05		35.91		<0.001	*542*
Number of children	0.89	1.28	1.78	1.38	<0.001	*540*
Ethnic condition						
Understands indigenous language (%)	0.10		0.33		<0.001	*548*
Considers him/herself indigenous (%)	0.18		0.34		0.25	*548*
Training courses: years since last course about care for …						
… patients with metabolic syndrome	0.88	1.38	1.27	1.70	0.02	*402*
… pregnant women	0.58	1.14	0.83	1.41	0.05	*443*
… children	0.79	1.32	0.80	1.36	0.98	*439*
Training about *Oportunidades* (%)	0.66		0.73		0.12	*540*
Training to teach self-care workshops (%)	0.60		0.82		<0.001	*366*
Work activity						
In the last 4 weeks…						
… number of days worked for the unit	19.77	5.32	18.34	5.58	<0.001	*530*
… number of days of training	1.07	2.3	0.76	1.93	0.13	*503*
… number of days of rest	5.75	4.77	5.94	4.88	0.68	*512*

The average work week is 5 days, with an average of 10 hours of service per day, during which services are provided to approximately 20 patients (see Figure 9).

Figure 9: Distribution of number of daily patients served by clinic



In terms of access to public services at the health facilities, some constraints were detected. Health facilities have electricity, but they occasionally have interruptions in the supply. Approximately 30% of the units do not have running water, and about half do not have a sewage connection, so they use septic tanks.

Regarding their referral system, that is, the capacity of units to refer patients that they cannot treat (either due to a lack of qualified staff or a shortage of equipment and/or supplies) to units with higher technical capacity, the long transfer distances may reduce their effectiveness. Referral facilities for women with obstetric emergencies or very sick children are located an average of 32 kilometres away, with an average commute time of 1.5 hours. In general, transportation to referral facilities is the patients' responsibility (more than 70% of cases), that is, no transportation is provided by the health facilities.

As presented in Figures 10 and 11, referral facilities for obstetric emergencies and severely sick children are located even as many as 200 kilometres away; examining the distribution of the distance showed that for a significant portion of the units, the distance to the referral units is more than 100 kilometres away, which results in a transfer time delay of 40 hours.

Figure 10: Distribution of the distance to referral health units for obstetric emergencies (in Km)

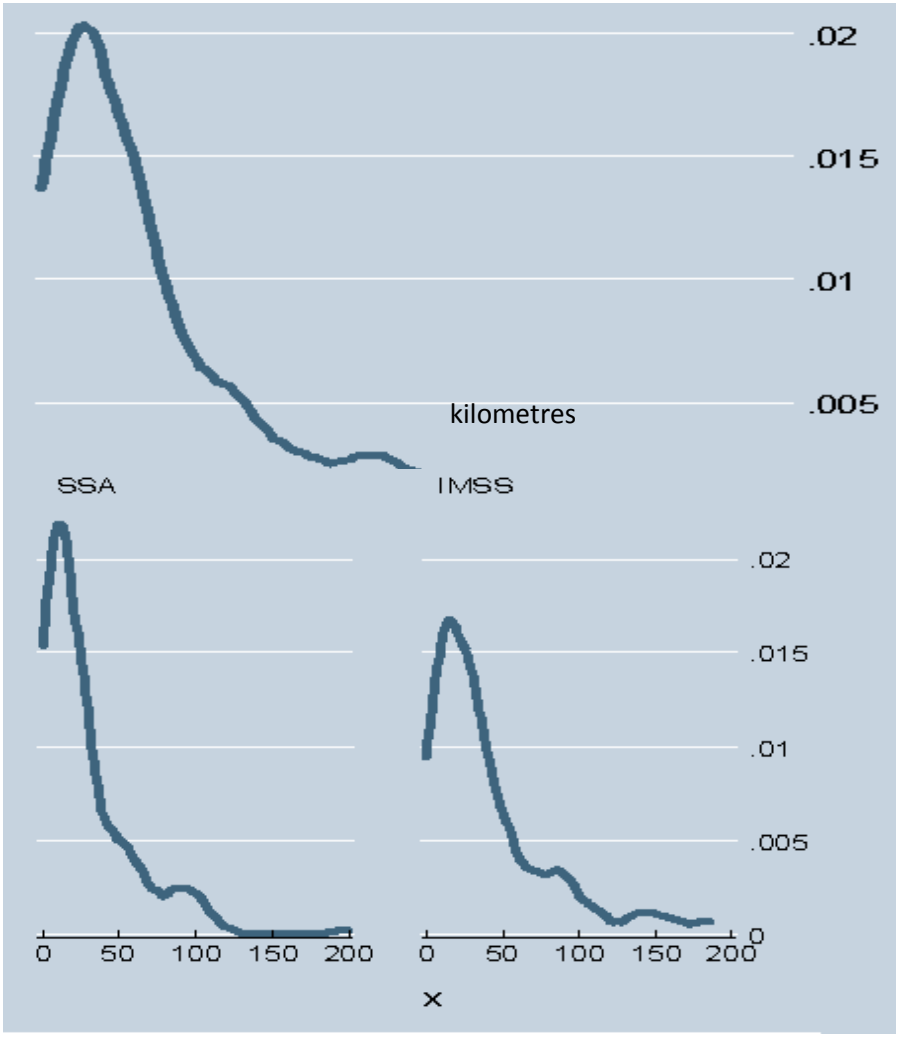
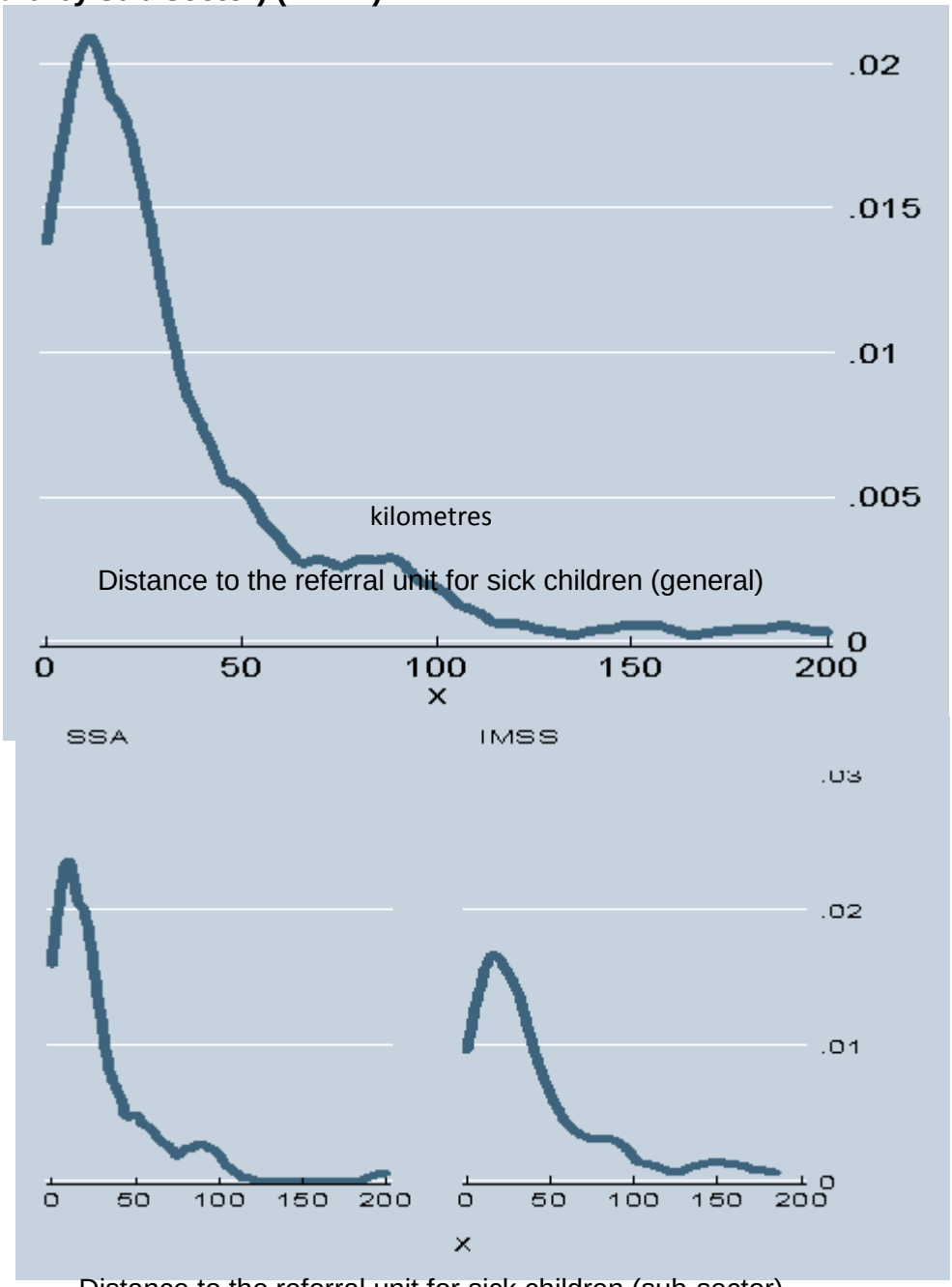


Figure 11: Distribution of the distance to referral units for very sick children (general and by sub-sector) (in Km)



Distance to the referral unit for sick children (sub-sector)

In terms of the use of documents or guidelines for patient care and for prescription, although current and accessible information could be considered a mandatory requisite for service operation, among the facilities in the sample, 10% reported not having basic drug listings, and 16% reported not having copies of the basic manual of *Oportunidades.* This is a document that contains and lists all of the

procedures and activities related to the Program that should be applied by the health units. Only half of them have a copy of any pharmacopeia or some document that explains pharmacology and drug dosage.

Using the same logic, the use of official norms and guidelines is limited, and only in the case of the Diabetes guide did more than half (barely 53%) of the doctors mention having used it in the last 6 months. Nearly a third of the staff reported using a source of information other than the Mexican Official Norms (NOM) and guides (see table 24). Following guidelines has been proposed as a factor to improve quality. (Ehiri, Oyo-Ita et al. 2005)

Table 24: Characteristics of the use of information for clinical practices

	Doctors		Nurse			
	Mean	**SD**	**Mean**	**SD**	**Value p**	***n***
Clinical Guides used in the last 6 months						
None (%)	0.08		0.14		0.04	*548*
Diagnostic and management of DM (%)	0.53		0.35		0.00	*548*
Management of high blood pressure (%)	0.5		0.28		0.00	*548*
Prenatal Care (%)	0.39		0.24		0.00	*548*
Monitoring of nutrition, growth, and development of children under 5 years of age (%)	0.31		0.3		0.94	*548*
NOM-174-SSA1-1998 for Integral Management of Obesity (%)	0.16		0.08		0.01	*548*
Official Mexican Standard (%)	0.25		0.21		0.27	*548*
NOM-037-SSA2-2002 for prevention, treatment and control of dislipidemy (%)	0.12		0.06		0.02	*548*
Other (%)	0.35		0.34		0.73	*548*
Source for information on medicines						
Basic table (%)	0.22		0.32		0.01	*545*
SSA Compendium (%)	0.03		0.05		0.17	*545*
PLM (%)	0.52		0.22		0.00	*545*
Vademecum (%)	0.14		0.08		0.04	*545*
Internet (%)	0.02		0.02		0.66	*545*
Other (%)	0.05		0.05		0.7	*545*
None (%)	0.02		0.25		0.00	*545*

6.2.3 Analysis of Adequacy (descriptive)

The analysis of adequacy is a simple comparison of characteristics of the health units (infrastructure, equipment, supply of prescription drugs, services provided) against a normative reference, that is, the structural conditions expected according to Mexican regulations or similar documents. From this, the percentage of items that are available at each facility is calculated. (Gilson, Magomi et al. 1995; Berendes, Heywood et al. 2011)

For the normative approach, the existing documents about the characteristics of the units correspond to the Medical Units Model published by the Under Secretariat of Innovation and Quality and the Guides for Equipment for Health Centres and Community Hospitals of the Health Technologies Evaluation Centre. Five types of units described in the Integrating Model of Health Care (IMHA) were included in the first level of care: Health Post, Rural Health Centres,

Health Centre for Urbanized and Settled Rural Population, Health Centres with Extended Services (HCES), and Community Hospitals. The differences between these types of facilities are related to their size, both in terms of the infrastructure and staff; in this sample, health posts are the more basic facility, and community hospitals are more complex. Although the focus of this analysis is primary care, these hospitals were included because they provide primary care for some localities.

For each type of facility, the above-mentioned documents described the expected organisation, functioning, and design characteristics, among other elements, including the staff, defined as clusters of personnel (CENETEC ; Secretaría-de-Salud 2006; Secretaría-de-Salud 2006). There were some localities served by mobile teams within the sample that are not described in these documents; thus, the same requirements that these documents described for the health post were used for these mobile teams. The IMHA established that: "Health Posts are Auxiliary Units where Mobile Brigades operate". Even if the documents contain substantial aspects of Organization, Functioning, Architectural Design, and Basic Equipment, for consistency, all information related to Drugs and Supplies was analysed using the guidelines of the Multiple Content Manuals dating from 1988 (according to the authors, there are no recent publications on these guidelines), which is the most complete document on this matter. These documents were established alongside the Health Care Model for the General Population, and its main goals are to unify the planning, programming, instrumentation, and control criteria of healthcare units; to strengthen the national health system by providing general guidelines on management actions for primary care; and to optimise the quality and quantity of the population's health services (Secretaría-de-Salud 1988; Secretaría-de-Salud 1988; Secretaría-de-Salud 1988; Secretaría-de-Salud 1988; Secretaría-de-Salud 1988).

Because they are operated by a different provider (IMSS-Oportunitidades), information on the characteristics of Rural Medical Unit(s) and Rural Hospital(s) is not included in the general list by the MoH; the reference for these types of

facilities were those developed by IMSS-Oportunidades (IMSS 2005), which were complemented by the Programme´s Rules of Operation (IMSS 2007).

Because the minimum supplies that a facility requires according to the documentation are related to the type of facility, it is important to establish a reference lists for each type of facility. The normative structure of the units, as defined for the documents, is listed in Table 37, in the annex.

It is important to note that this analysis is the most basic approach to structure, as it merely requires each unit to have at least one of the listed areas/supplies/drugs/staff and does not take quantity into account. In addition, only the possession of the equipment by the facilities was considered, and whether the equipment was functional was not taken into account. In this sense, this analysis of adequacy could be viewed as the lower bound of structural quality.

6.2.4 Structural quality index

The previously detailed descriptive analysis generates an overall picture of the health facilities' structural quality and also allows for comparisons by sub-sectors, providing information on the heterogeneity of services that are normally expected to be homogeneous. This issue, heterogeneity, is particularly relevant, as homogeneity is required for the standardisation of services and is thus an important measure of quality.

To generate a measure that allows comparison among units in a single measure and makes comparison and ranking a straightforward process, a quality index was produced. In essence, the proposed single measure would incorporate the observed information to provide a meaningful value indicating the quality of the health facilities included.

Generating such an index assumes that this value exists but is a non-observed or latent variable. Methods developed for this type of analysis include the general approach of factor analysis (FA).(van Belle, Fisher et al. 2004) FA assumes that by using observed variables, it is possible to obtain a value that represents the unobservable factors (the latent variables). The primary limitation of

this approach is that the outcome variable is not explicit (because is a latent variable), so it is necessary to have observed variables that are conceptually related to the desired outcome. The advantage of this method is that it allows a single value to be generated from several indicators.

For this quality index, the observed variables included were the percentages of adequacy in the above-described categories: infrastructure or areas, equipment, supplies, drugs, and services provided, as reported by the health units. As all values were included as the percentage of adequacy (which, as mentioned above, is specific for the type of facility), these values are comparable across facilities.

To test for the appropriateness of the data used for the FA, the Kaiser–Meyer–Olkin measure of sampling adequacy was estimated; we also tested whether the selection of one factor was adequate for this analysis.

The index was categorised into four groups of relative quality based on a visual exploration of the score to identify clustering that shown low and high performers, as well as a wide range of middle performers. Score data were plotted on a quantile chart with uniform size distribution. Groups were labelled as low, medium-low, medium-high, and high quality. Although the labelling and the cut-off points are somewhat arbitrary, they are useful to paint a picture of quality in the primary care facilities serving the poor population of Mexico.

It is important to note that these categories are based on the relative heterogeneity in the sample and are thus not necessarily reflective of the general health clinic situation in the country. However, it should also be noted that this is the largest study to date on the quality of primary care facilities in Mexico.

6.2.5 Multivariable analysis of factors associated with structural quality

Using the quality index as a dependent variable, a multi-variable regression was estimated to measure its association with locality factors and other general characteristics. As data from the localities were obtained from other sources, coding issues with the localities prevent the merging of all health facilities in the

sample. Only 327 health facilities serving 484 localities were correctly merged with Census and other data sources, which is approximately 80% of the effective sample. Nevertheless, this sub-set included localities in the 13 states.

I explored the relation between quality and different measures of the socioeconomic status at the locality level; the measures used were marginalisation index and the average SE level of households (estimated using an imputation method detailed elsewhere and described in chapter 2). I also analysed the role of provider type on quality based on the sub-sector and the state of the facility.

The marginalisation index is a measure constructed by the National Population Council (CONAPO for its Spanish acronym). This index is developed using Census data, and it is an aggregate measure of living conditions, including schooling (literacy and primary school), housing (access to water, sewage, and electricity), and income. (CONAPO 2002) Data are available on-line at CONAPO´s website.[x]

The average SE level of the households was estimated using data from the households of the health facility users, so it represents the SE level of users and not necessarily the SE level of all local HHs. For each household, data collected from the users were used to determine the SE level using an approach I developed based on a procedure proposed for the SE classification of HH. This variable was constructed using socio-demographic and housing characteristics, including assets, to impute a value from a national income and expenditures survey. More detail on the procedure is reported elsewhere. (Gutierrez 2008)

The type of provider was defined as IMSS-Oportunidades facilities or MoH facilities; it is important to remember that MoH facilities are operated by the state MoH, so controlling for state is also relevant for the type of provider variable.

[x] www.conapo.gob.mx, in the section related to the marginalization index.

6.2.6 Quality and aggregate outcomes

An additional analysis was implemented to measure how much the quality index was correlated with health outcomes. The main challenge of this analysis is to gather an outcome indicator that may be related to quality within the desired timeframe and available at the same observation level, that is, the health facility. Both challenges are major constraints, and the solution allows only for an approximation of the desired analyses. For example, I explored the use of the infant mortality rate, which is usually regarded as a measure related to current health situation in the sense that measures health conditions in a given year, as an indicator of quality. The primary limitation of this approach is that mortality rate data are not available at the locality level, but only at the larger, municipality level and that it could be significant underreporting, and more over, this underreporting may be higher in the localities with the worse health services, so results could be totally biased.

In order to sort underreporting, the use of primary data from the same survey seems as preferable alternative, but not mortality data is feasible from it. As an alternative measure, the proportion of individuals that were reported to being sick in the 4 weeks before the survey was used. This measure was estimated for the complete population and by age-groups.

Correlations between the quality index and categories of the index and these provalences of morbidity were estimated by age-group and for the complete population.

6.4 Results

The description of conditions in health care units allows us to determine whether they have the required resources to offer quality care, in particular, to evaluate whether the staff, supplies, and medications available at the health centre allow required interventions to be offered to users. Structural analysis is a practical method to evaluate quality of care in the visited units. Moreover, the heterogeneity

of these units is examined by identifying differences between subsectors and types of units, as well as the variation among them.

3.4.1 Adequacy of the structure at the health facilities

Areas at the health facilities

The percentage of each area at the facilities by type is reported in Table 25. For hygienic reasons and privacy, it is expected that units will have different areas for different activities. Units with appropriate spaces are more capable of offering quality services. All units observed have an office and a waiting room. Less than half of the units have a training area (a significant portion of these units were IMSS-*Oportunidades'* units) or a labour and delivery room for childbirth. In general, they do not have a laboratory area, and the refrigeration area is small, even though a larger area is designated for vaccine storage.

Table 25. Infrastructure of Patient Attention

Variables	All	Subsector SSA**	IMSS-OPORTUNIDADES	Value p*
Exam room[1,3]	97%	95%	99%	**0.03**
Nurse´s room[3]	67%	64%	67%	**0.56**
Waiting Room	91%	87%	96%	**0.00**
Training room	48%	29%	79%	**0.00**
Storage Area[1]	70%	63%	78%	**0.00**
Cold Box med[1,2]	32%	25%	39%	**0.00**
Cold Box vaccines[1,2]	80%	71%	93%	**0.00**
Labour Room[1]	43%	37%	48%	**0.03**
Personnel bathroom	83%	78%	89%	**0.00**
Patient bathroom[1]	72%	70%	72%	**0.74**
General Bathroom	29%	24%	37%	**0.00**
Pharmacy[3]	60%	53%	66%	**0.01**
Treatment Room	52%	47%	55%	**0.15**
Delivery Room[1]	51%	46%	53%	**0.19**
Admission area[1,3]	69%	53%	91%	**0.00**
Dormitory	75%	62%	95%	**0.00**
DB storage room[1]	29%	22%	31%	**0.04**
Emergency Room[1]	20%	11%	26%	**0.00**
Operating Room	8%	4%	10%	**0.01**
AC Laboratory [1,3]	6%	3%	1%	**0.09**
Vaccination room	29%	32%	17%	**0.00**
Cleaning Room	28%	27%	22%	**0.28**

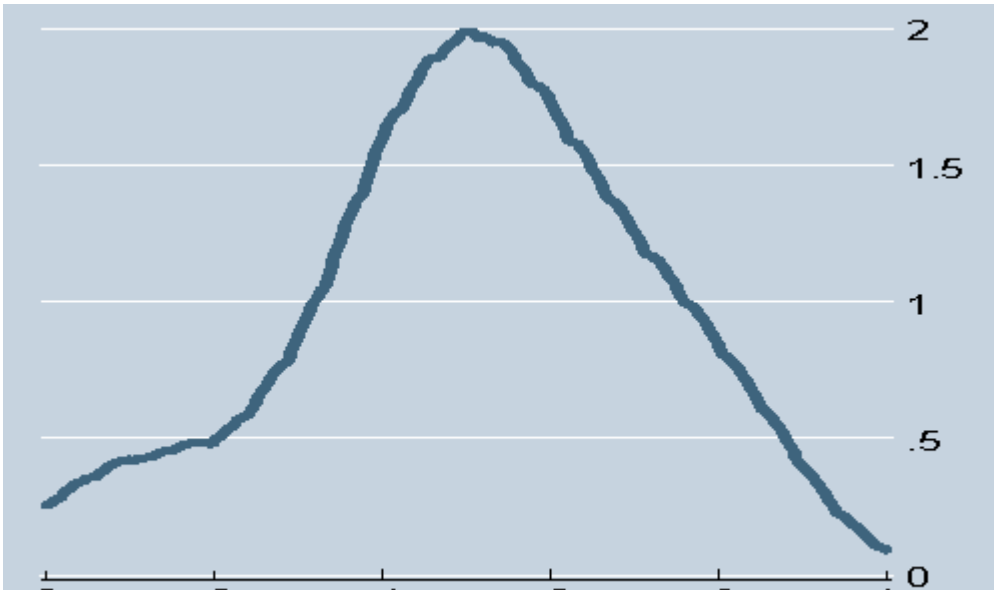
*** Probability value of t test for mean difference**
**** SSA: Health Centres, health houses, mobile units, mobile brigades**

[1] **Supplies necessary for child birth attention**
[2] **Supplies necessary for child care**
[3] **Supplies necessary for metabolic syndrome attention**

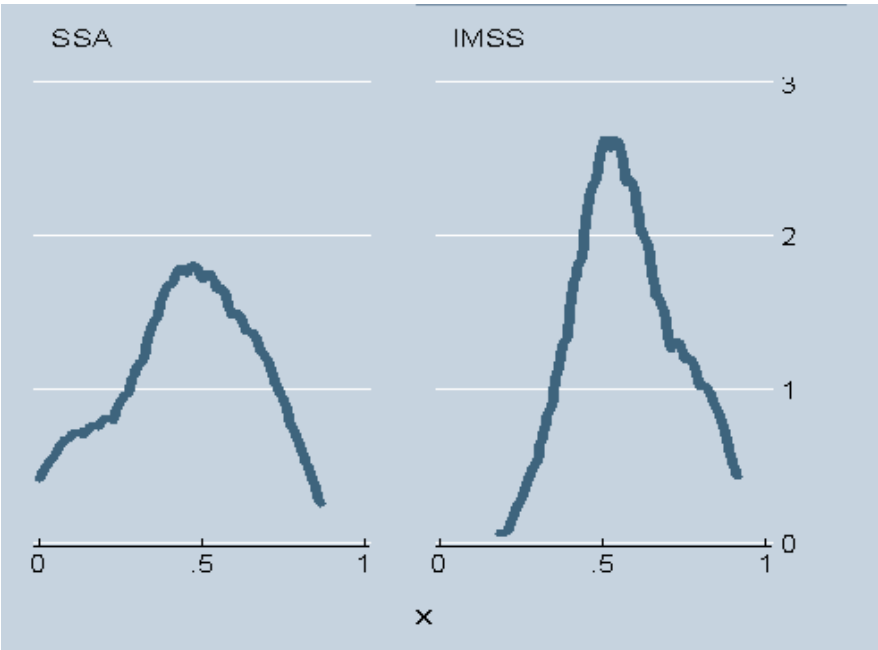
A visual representation of adequacy in terms of areas reflects significant heterogeneity, as shown in Figure 12; some facilities are far to the left of the chart, meaning that they lack many essential areas.

Figure 1: Areas distribution

Percentage of areas designated for patient care (All)



Percentage of areas designated for patient attention (SSA-IMSS-*Oportunidades*)



Equipment

As mentioned above, in terms of equipment, the analysis was based on the presence of each item and not whether the item was fully operational. The revised equipment list was based on the normative list, and it focused on basic equipment that should be available in primary healthcare units. As shown in Table 26, basic equipment absences are common. The equipment required to perform physical examinations of patients – such as scales, Baumanometers, otoscopes, and thermometers – do not exist in a large number of units, even though they would normally be used daily.

Likewise, other relatively sophisticated equipment essential for users with common conditions, such as an electrocardiograph, microscope, or Doppler equipment, is found only in a few units. Furthermore, only one-tenth of all clinics possess an ambulance for transfers. Clinics that operate without this equipment can barely perform basic activities, as they lack the minimum instruments for patient examination and diagnosis.

Table 26. Medical Equipment

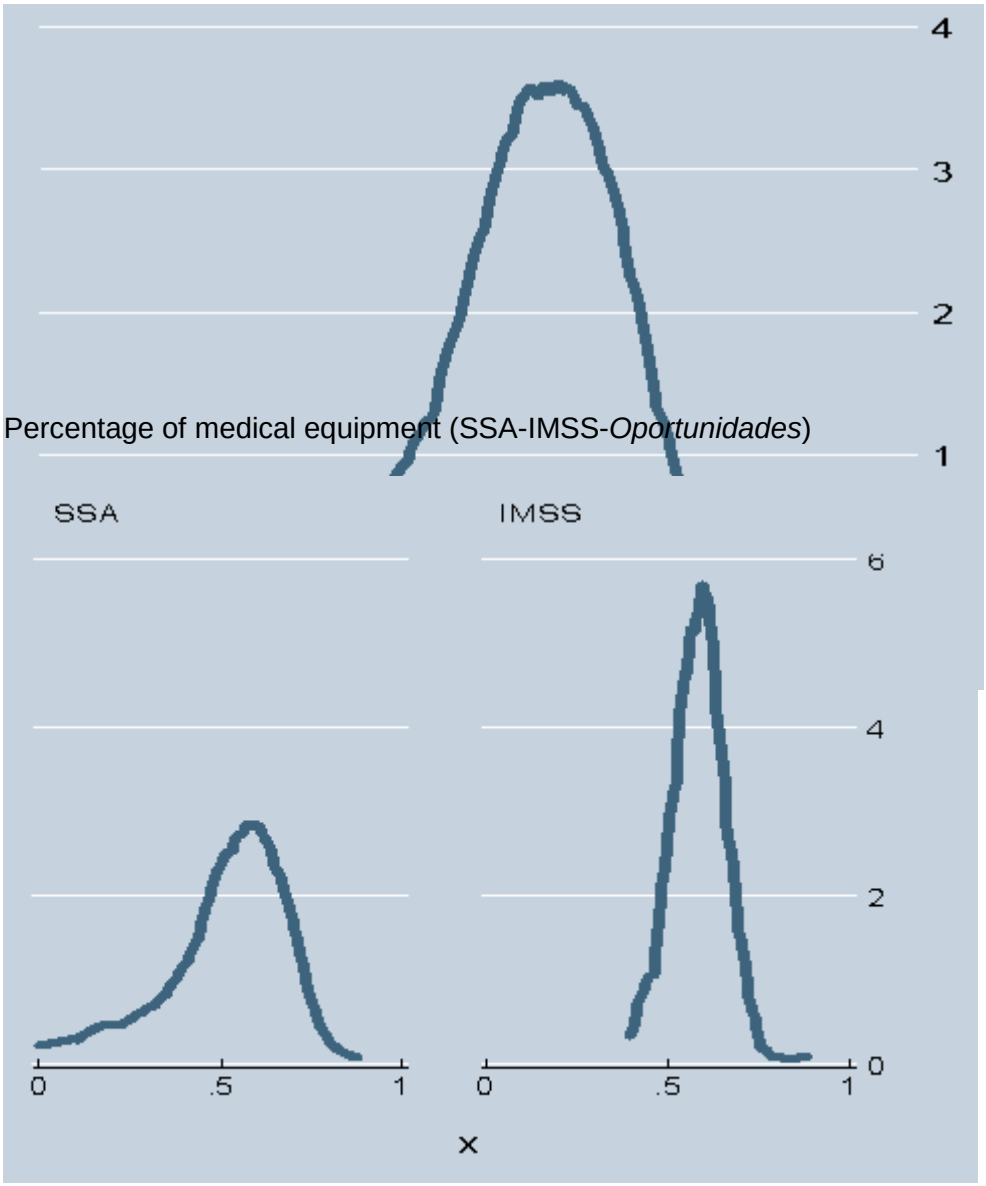
Variables	General	Subsector SSA**	IMSS-OPORTUNIDADES	Value p
Ambulance[1]	10%	10%	3%	**0.01**
File Cabinets	43%	54%	23%	**0.00**
EMAU Syringe[1]	12%	2%	22%	**0.00**
Steriliser[1,2]	58%	65%	42%	**0.00**
Paediatric scale[1,2]	92%	89%	97%	**0.00**
Infantometer	75%	64%	93%	**0.00**
Adult scale[1,2,3]	96%	95%	98%	**0.08**
Stadiometer[1,3]	85%	78%	96%	**0.00**
Sphygmomanometer[3]	91%	88%	97%	**0.00**
Stretcher[1,3]	17%	17%	8%	**0.01**
Oxygen tank[1]	26%	26%	19%	**0.14**
Metric tape[1]	96%	95%	99%	**0.03**
Containers	75%	67%	85%	**0.00**
Doppler[1]	13%	15%	4%	**0.00**
Minor Surgery set	54%	48%	68%	**0.01**
Electrocardiogram[3]	3%	0%	1%	**0.06**
Ultrasound equipment[1]	5%	2%	1%	**0.62**
X-ray equipment	6%	2%	2%	**0.61**
Stethoscope[1,3]	93%	90%	97%	**0.00**
Foetal stethoscope[1]	93%	90%	97%	**0.00**
Washbasin[1]	88%	82%	97%	**0.00**
Tray stand	84%	76%	95%	**0.00**
Microscope	8%	5%	4%	**0.67**
Ophthalmoscope[3]	48%	43%	53%	**0.05**
Otoscope	45%	44%	42%	**0.69**
Refrigerator[1,2]	82%	75%	90%	**0.00**
Eye Chart[3]	68%	53%	85%	**0.00**
Thermometer[1]	92%	88%	97%	**0.00**
Tococardiogram[1]	6%	4%	5%	**0.53**
Clock[1,2]	34%	30%	36%	**0.29**
Oral Electrolytes[2]	90%	87%	93%	**0.05**
Reg book med[2]	74%	62%	90%	**0.00**
Reg book vaccines[2]	83%	75%	94%	**0.00**

*** Probability value of t test for mean difference**
**** SSA: Health Centres, health houses, mobile units, mobile brigades**
[1] Supplies necessary for childbirth attention
[2] Supplies necessary for child care
[3] Supplies necessary for metabolic syndrome attention

Regarding the heterogeneity in how well equipped the facilities are, as shown in Figure 13, the distribution clearly shows a generalised lack of equipment

and a scenario in which, at best, only 70% of the equipment required to operate is available.

Figure 2: Distribution of minimum equipment by health centre (total percentage)



Supplies

In terms of the existence of supplies for primary medical care, the list of supplies includes those needed to provide basic care and is focused on common conditions found in the Mexican population. Once again, it is a matter of having the necessary supplies in all units to conduct proper care on a regular basis.

Table 27 reports the percentage of supplies in the health facilities on the day of the visit. In some clinics, even basic supplies (such as gauze or tongue depressors) were missing. The high percentage of clinics without the supplies necessary to monitor basic and everyday conditions (e.g., pre-natal care consultations) is alarming. The limited existence of urine test strips complicates the monitoring of pregnancy, and the low percentage of health facilities with glucose test strips in a country with a high prevalence of diabetes prevents timely detection of this condition.

Table 27. Medical Material

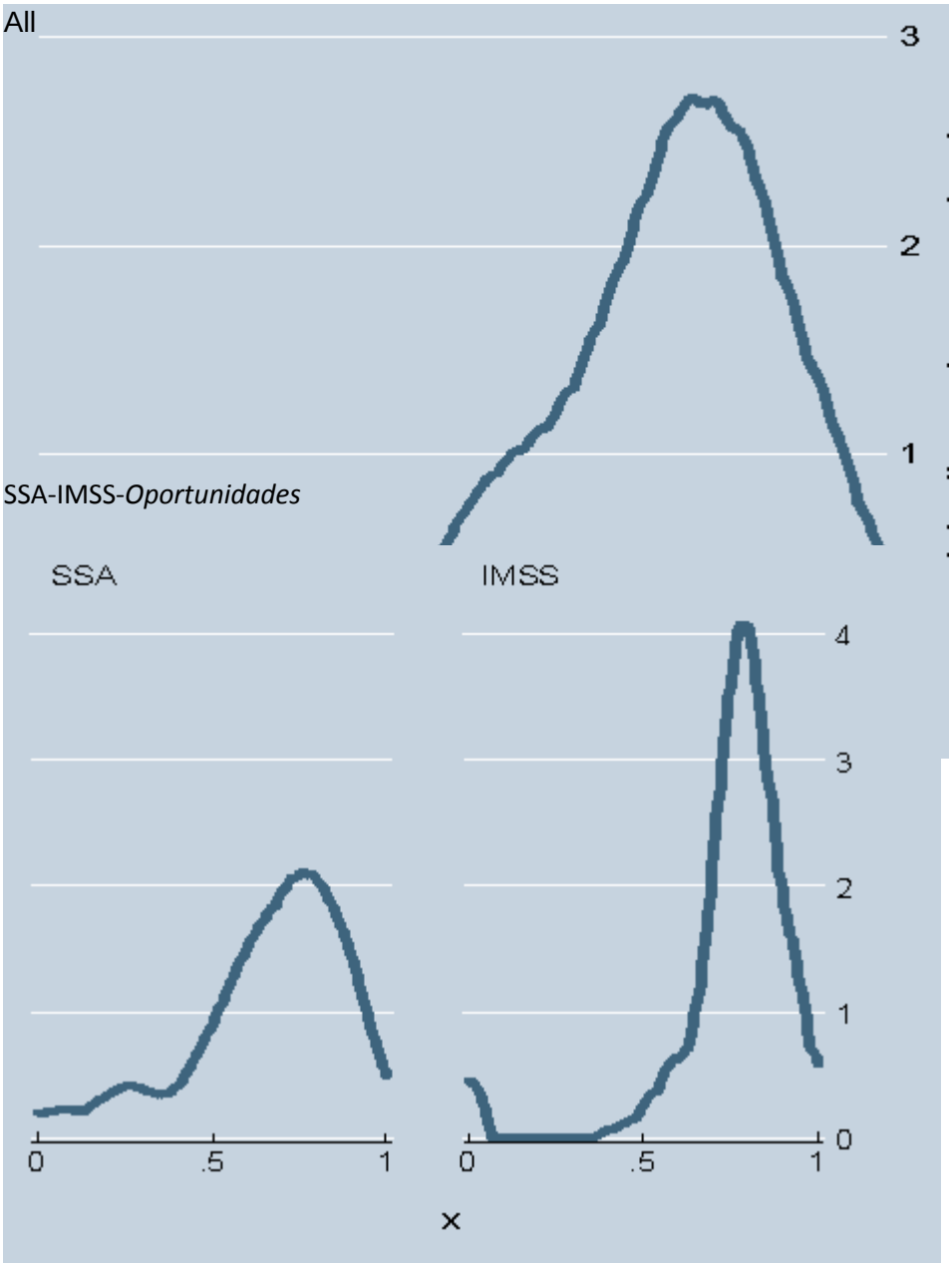
Variables	All	Subsector SSA**	IMSS-*Oportunidades*	Value p*
Tongue depressors[2]	94%	92%	98%	**0.00**
Alcohol	90%	88%	94%	**0.06**
Cotton	94%	95%	95%	**0.98**
Benzal	58%	56%	61%	**0.28**
Condoms[1]	92%	93%	94%	**0.60**
Disposable face masks[1]	87%	87%	86%	**0.76**
IUD[1]	86%	80%	96%	**0.00**
Vaginal Speculum[1]	89%	83%	98%	**0.00**
Dissection set	59%	54%	66%	**0.01**
Gauze[1]	89%	86%	93%	**0.03**
Gloves	92%	90%	95%	**0.13**
Iodine	90%	88%	93%	**0.07**
Surgical lubricant	83%	76%	96%	**0.00**
Liquid soap[1]	60%	67%	47%	**0.00**
Hand soap	74%	67%	85%	**0.00**
Syringes[2]	93%	90%	97%	**0.01**
Instrument set[1]	69%	57%	88%	**0.00**
Bed linen	77%	69%	91%	**0.00**
Punzocat	79%	72%	88%	**0.00**
Surgery robes	62%	47%	85%	**0.00**
Catheter	36%	31%	40%	**0.08**
Foley catheter	52%	40%	68%	**0.00**
Sutures	80%	73%	92%	**0.00**
Adhesive gauze	91%	90%	93%	**0.23**
Towels	47%	44%	50%	**0.29**
Glucose strips[1,3]	78%	73%	89%	**0.00**
Urine strips[1,3]	46%	35%	63%	**0.00**
Thermos	66%	60%	74%	**0.00**
Disposable towels	36%	29%	47%	**0.00**
Vacutainer	19%	20%	15%	**0.19**
Elastic bandages	81%	79%	84%	**0.19**

Variables	All	Subsector SSA**	IMSS-*Oportunidades*	Value p*
Venoset	45%	42%	47%	**0.44**
Sample collection cups	67%	65%	71%	**0.22**

*** Probability value of t test for mean difference**
**** SSA: Health Centres, health houses, mobile units, mobile brigades**
[1] Supplies necessary for childbirth attention
[2] Supplies necessary for child care
[3] Supplies necessary for metabolic syndrome attention

Regarding the distribution of existing supplies, a group of clinics with significant needs and an average group, which tends to have the most supplies, are observed (Figure 14).

Figure 3: Percentage of medical supplies (general and by sub-sector)



Medicines

As for the supply of basic drugs, as in the previous items, significant heterogeneity is observed in Table 28 and Figure 15, with some units lacking most drugs. The supply difference is clear among subsectors in which the IMSS-Oportunidades units show higher percentages of supplies compared to those of the MoHs.

The list of medicines presented is included in the basic set for these clinics, meaning that they are theoretically available in every unit. It includes drugs for common problems (paracetamol) as well as those required for emergencies (tetanus toxoid).

Figure 4: Drug supplies

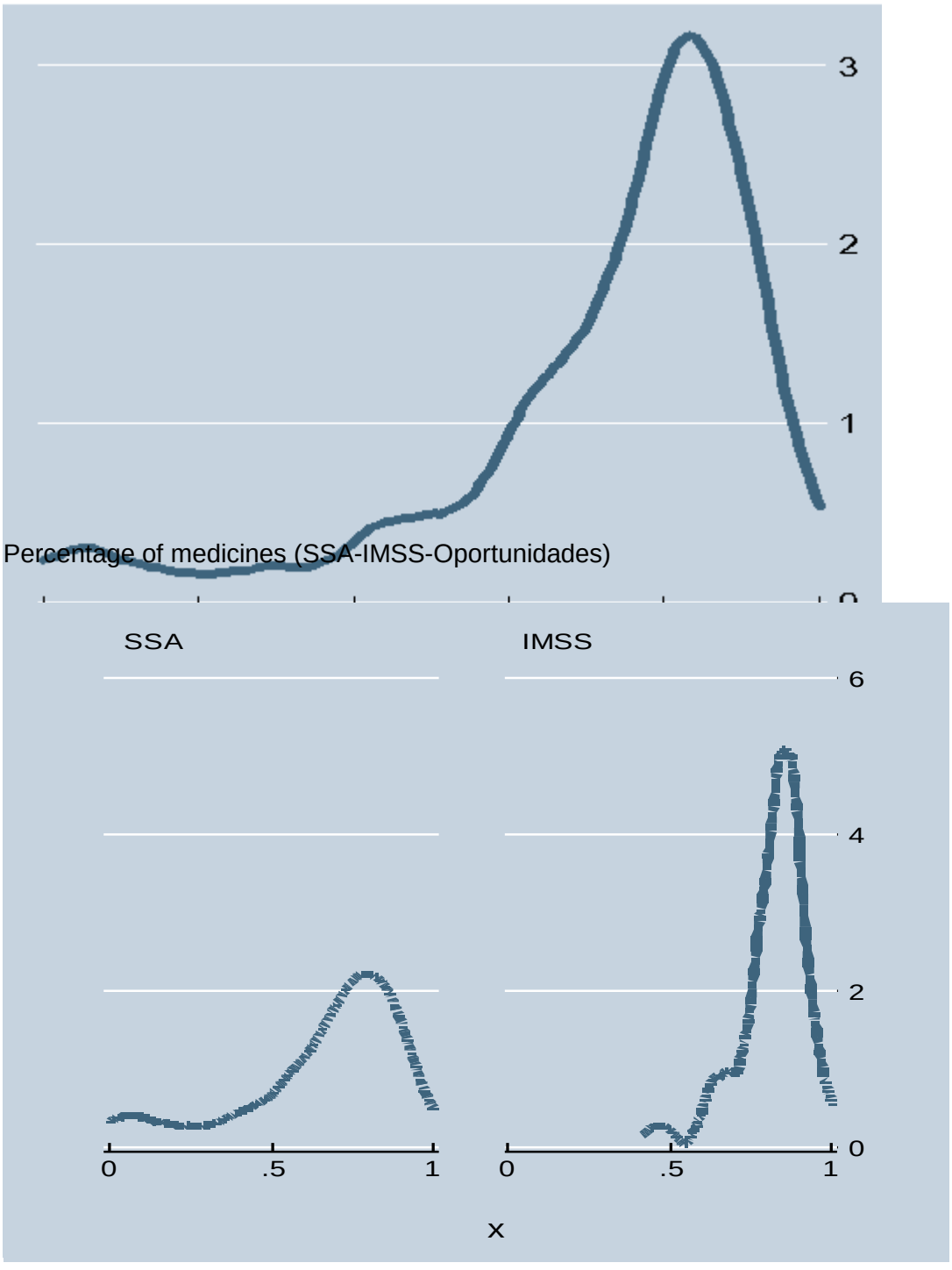


Table 28: Adequacy of medicines by type of facility

Variables	General	Subsector SSA**	IMSS-*Oportunidades*	Value p*
Acetylsalicylic acid[3]	80%	83%	75%	**0.04**
Paracetamol tab[1,2]	79%	76%	84%	**0.07**
Paracetamol sol[1,2]	77%	70%	89%	**0.00**
Sodium Metamizol	82%	75%	93%	**0.00**
Lidocaine sol inj[1]	82%	79%	87%	**0.04**
Clorfenamine tab	82%	76%	91%	**0.00**
Clorfenamine syr	80%	74%	88%	**0.00**
Propanolol[3]	58%	51%	65%	**0.00**
Captotril[3]	76%	70%	88%	**0.00**
Nifedipine caps[1,3]	74%	68%	85%	**0.00**
Metoprolol[3]	63%	66%	54%	**0.01**
Hidroclorotiazide[3]	40%	44%	30%	**0.00**
Aluminium/magnesium	84%	78%	93%	**0.00**
Ranitidine	85%	81%	91%	**0.00**
Butilnioscine inj	85%	78%	94%	**0.00**
Albendazole tab[2]	82%	77%	90%	**0.00**
Albendazole susp[2]	85%	83%	89%	**0.06**
Metronidazole tab[2]	87%	80%	98%	**0.00**
Metronidazole susp[2]	87%	81%	97%	**0.00**
Gilbenclamide[3]	85%	78%	95%	**0.00**
Metformine[3]	76%	74%	81%	**0.13**
Insulin[3]	40%	39%	38%	**0.75**
Trimethoprim tab[1,2]	87%	82%	95%	**0.00**
Trimethoprim susp[1,2]	88%	84%	95%	**0.00**
Bencilpenicillin 1[1,2]	79%	73%	86%	**0.00**
Bencilpenicillin 2[1,2]	74%	68%	83%	**0.00**
Bencilpenicillin 3[1,2]	69%	69%	68%	**0.88**
Benzidine	74%	66%	85%	**0.00**
Dicloxacillin cap[2]	80%	72%	93%	**0.00**
Dicloxacillin susp[2]	75%	63%	92%	**0.00**
Ampicillin tab[2]	78%	67%	93%	**0.00**
Ampicillin susp[2]	80%	70%	95%	**0.00**
Eritromicine tab[2]	80%	71%	94%	**0.00**
Eritromicine susp[2]	77%	65%	94%	**0.00**
Chloramphenicol cap	53%	40%	72%	**0.00**
Amoxicillin susp[2]	74%	74%	72%	**0.61**
Amoxicillin cap[2]	73%	71%	73%	**0.65**
Chloramphenicol sol[2]	70%	61%	83%	**0.00**
Chloramphenicol ung[2]	45%	33%	63%	**0.00**
Neomycin	61%	43%	90%	**0.00**
Salbutamol syr	75%	64%	92%	**0.00**
Ambroxol	75%	65%	91%	**0.00**
Bencilo	72%	64%	85%	**0.00**
Zinc oxide	**83%**	**80%**	**89%**	**0.02**

Variables	General	Subsector SSA**	IMSS-*Oportunidades*	Value p*
Lindane	28%	38%	12%	**0.00**
Clioquinol	78%	69%	92%	**0.00**
Miconazole	83%	80%	89%	**0.01**
Folic acid 1[1]	75%	68%	85%	**0.00**
Folic acid 2[1]	72%	78%	62%	**0.00**
Fumarate tab[1]	76%	68%	89%	**0.00**
Fumarate susp[1]	77%	68%	91%	**0.00**
Levonorgestrel[1]	84%	79%	94%	**0.00**
Desogestrel[1]	74%	61%	95%	**0.00**
Medroxyprogesterone	82%	77%	90%	**0.00**
Enanthate	69%	60%	85%	**0.00**
Condoms (masculine)	91%	90%	94%	**0.11**
Glucose @ 5%	75%	62%	93%	**0.00**
NaCl 0.9%[3]	74%	64%	88%	**0.00**
Sol Hartman[2,3]	75%	65%	90%	**0.00**
Electrolytes[2]	90%	88%	93%	**0.15**
Streptomycin	14%	12%	14%	**0.54**
Isoniazide	23%	20%	26%	**0.16**
Sabin	56%	46%	72%	**0.00**
BCG[2]	69%	56%	87%	**0.00**
DPT[2]	75%	72%	79%	**0.10**
Tetravalent[2]	28%	26%	30%	**0.47**
Triple viral	80%	73%	93%	**0.00**
Measles[2]	59%	52%	71%	**0.00**
Tetanic toxoid[1, 2]	81%	74%	91%	**0.00**
Children complement[2]	90%	86%	96%	**0.00**
Women complement	88%	84%	95%	**0.00**

*** Probability value of t test for mean difference**
**** SSA: Health Centres, health houses, mobile units, mobile brigades**
[1] Supplies necessary for childbirth attention
[2] Supplies necessary for child care
[3] Supplies necessary for metabolic syndrome attention

Services provided

Finally, and as a validation of the previous items, the adequacy of services provided in the facilities was analyzed. Services were defined as having proper facilities, equipment, supplies, and drugs. Table 29 summarises the services offered in the visited clinics and repeats the previously observed scenario; in addition to consultations, there are few additional services offered by the clinics. As in previous cases, the list of services includes those required for basic healthcare.

Basic haemoglobin tests and urine samples are offered in a low percentage of clinics. The PAP is only offered at 72% of the clinics, and obstetric ultrasounds are practically nonexistent in these clinics (4%).

Table 29: Services provided to the outpatient population

Variables	General	Subsector SSA**	IMSS-*Oportunidades*	Value p
Biopsy	2%	2%	0%	**0.07**
Caesarean section[1]	2%	0%	1%	**0.72**
Minor surgery	39%	33%	43%	**0.05**
Dental consultation	29%	34%	14%	**0.00**
Adult consultation[3]	95%	93%	97%	**0.05**
Paediatric consultation[2]	96%	95%	97%	**0.25**
Preg consultation[1]	96%	95%	97%	**0.19**
Nutrition monitoring	94%	94%	96%	**0.27**
Newborn care[1]	64%	59%	70%	**0.01**
Childbirth[1]	50%	39%	65%	**0.00**
Punctures	20%	13%	24%	**0.00**
Ultrasound[1]	4%	1%	1%	**0.92**
Emergencies	72%	66%	79%	**0.00**
Vaginal cytology[1]	80%	77%	83%	**0.16**
Microbacterial culture	4%	2%	3%	**0.61**
Syphilis detection[1]	9%	9%	2%	**0.00**
Electrocardiogram[3]	3%	0%	0%	**0.43**
GS and Rh[1]	7%	4%	2%	**0.19**
Glucose levels[1,3]	78%	74%	83%	**0.02**
Haemoglobin levels[1,3]	8%	5%	6%	**0.70**
Hemos glucoside[1,3]	6%	5%	2%	**0.07**
Urine tests[1,3]	47%	38%	57%	**0.00**
Blood chemistry[3]	5%	2%	1%	**0.13**
Ultrasound[1]	4%	1%	1%	**0.92**
Urine examination[1,3]	5%	2%	1%	**0.33**
Sample taking	2%	2%	0%	**0.07**
Skin tests	2%	1%	2%	**0.30**
Rx	3%	1%	0%	**0.26**
Bleeding times	3%	1%	0%	**0.17**
Uroculture	2%	1%	1%	**0.92**
Papanicolaou[1]	72%	71%	73%	**0.62**
Childbirths	47%	37%	59%	**0.00**
Odontology practice	20%	22%	10%	**0.00**
Ophthalmic revision[3]	28%	22%	37%	**0.00**
Healthcare workshops[3]	87%	83%	95%	**0.00**

* Probability value of t test for mean difference, ** SSA: Health Centres, health houses, mobile units, mobile brigades
[1] Supplies necessary for childbirth attention, [2] Supplies necessary for child care, [3] Supplies necessary for metabolic syndrome attention

3.4.2 Quality index

As previously mentioned, the structural quality index was developed using information from 408 clinics using factor analysis. The observed variables were the percentage of adequacy in areas, equipment, supplies and medicines, and services provided, and the estimation method was principal factors. As reported in table 30, the first factor was able to represent the structural quality, as the percentage of explanatory power for this factor was close to 100%.

Table 30: Factor analysis for the structural quality index

	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	2.56538	2.49985	1.0577	1.0577
Factor 2	0.06553	0.13832	0.027	1.0847
Factor 3	-0.07279	0.05983	-0.03	1.0547
Factor 4	-0.13262	.	-0.0547	1

The loadings for the first factor are reported in table 31. All 4 variables are positively related to structural quality, with adequacy on equipment having the larger weight , then supplies and medicines. In terms of this analysis, the interpretation is that all 4 variables are directly related to structural quality, with equipment and supplies & drugs having a larger effect on the index. It is also important to note that the uniqueness values are low in general.

Table 31: Factor 1 loadings

	Loadings	Uniqueness
Areas	0.7108	0.4579
Equipment	0.9228	0.1463
Supplies & drugs	0.8410	0.2791
Services	0.7080	0.4857

The results from the test of sampling adequacy are presented in table 32. The KMO measure indicated a value that could be considered to represent

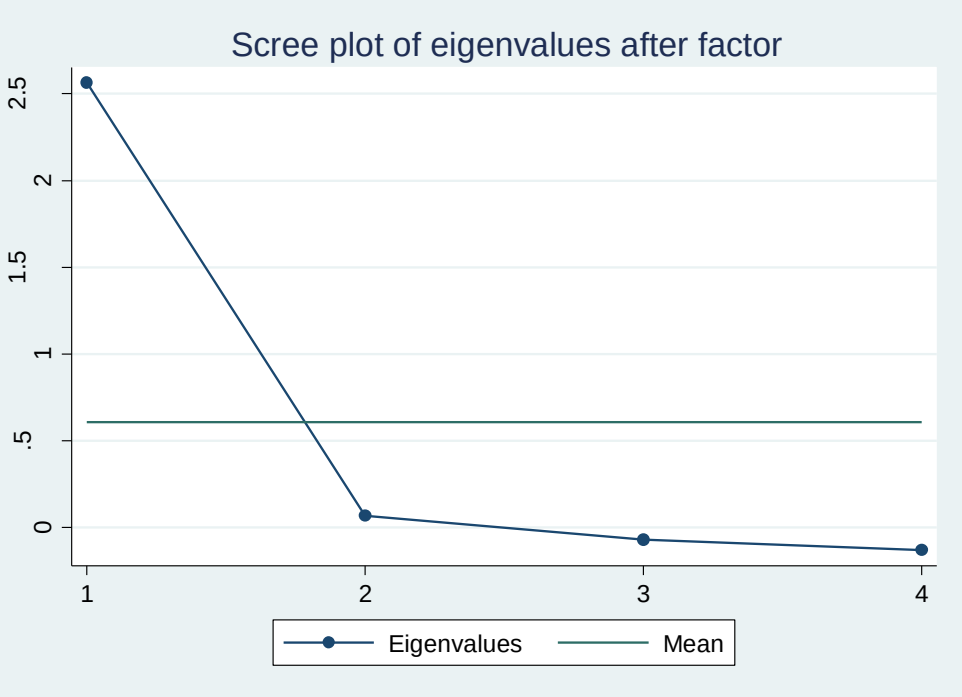
moderate adequacy; the KMO ranges from 0 to 1, and a lower value indicates that variables used for the analysis are insufficiently related to justify factor analysis.

Table 32: Sampling adequacy for the factor analysis

Value	KMO
Areas	0.7923
Equipment	0.6966
Supplies	0.7684
Medicines	0.8915
General	0.7705

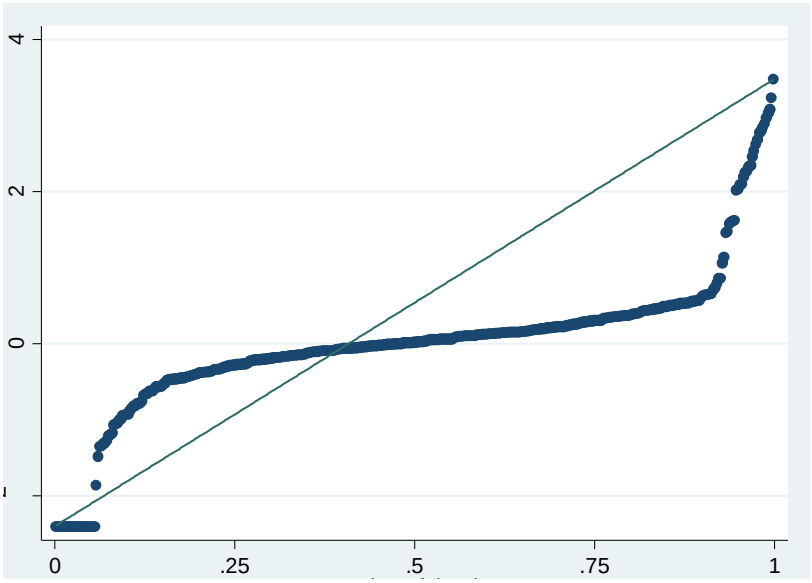
The number of retained factors was presented in a scree plot of the eigenvalues, which is a graphic representation on the fraction of total variance that is explained by each factor. As can be observed in Figure 16, the shape suggests the retention of one factor, as well as the fact that only the first factor is above the cut-off value used as a reference to select factors to be retained. As the eigenvalues of the factors 3 & 4 are negative (in general eigenvalues to be retained are expected to be greater than zero), the proportion that those factors explain of the variance are negative, so in the scree plot are below 0.

Figure 5: Scree plot for the factor analysis for the structural quality index



Based on the factor analysis obtained using the above regression methods, the index values from the first factor were between -2.4 and 3.5, with higher values for clinics with better structural conditions. In Figure 17, the index distribution is presented in a quantile distribution.

Figure 6: Distribution of the structural quality index of health units using a quantile distribution



Using the visual examination of the distribution following a quantile uniform distribution to define cut-off points, the index values were used to classify health facilities in relative quality categories as reported in Table 33. It is important to remember that this is a relative measure, in the sense that there is no external benchmark to compare the value. Nevertheless, it is important to highlight the significant heterogeneity in structural quality reflected by the fact that all four categories include a non-negligible per cent of facilities. In addition, the fact that more than 1 in 10 facilities were classified as low quality is even more striking considering that this relative measure was built from the previously discussed percentages of adequacy, which were below 100% and thus had some degree of deficiency.

Table 30: Distribution of units by structural quality category

Category	%
Low quality	**12.25**
Medium low quality	**35.54**
Medium high quality	**45.34**
High quality	**6.86**

3.4.3 Factors associated with quality

To analyse factors related to quality, a regression model was estimated using a dichotomous dependent variable, where a value of 1 represented medium-high and high quality, and 0 indicated low and middle-low quality. As detailed in the methods section, independent variables were locality level characteristics. As facilities under state Ministries of Health can be seen as belonging to different providers, state fixed-effects are included in the estimation, to control for variations that are more related to provider organization. The results of the estimated model are presented in table 34.

The average SE level of the localities was positively and significantly related to the probability of high quality. That is, localities where households have better conditions tend to also have better quality services. In terms of the providers, facilities operated by the IMSS-Oportunidades were associated with a lower probability of high quality compared to those operated by the states' MoH.

Table 31: Locality factors correlated with structural quality

	(1)
VARIABLES	high_quality
High marginalisation	-0.5962
	(0.5905)
Middle marginalisation	-0.1107
	(0.6251)
Low marginalisation	0.0920
	(0.7140)
Average SE level	0.9078***
	(0.3197)
Seguro Popular == 1	0.1977
	(0.2766)
IMSS-Oportunidades ==1	-1.1277***
	(0.2555)
State 7	-1.7540*
	(0.9343)
State 10	-1.2335
	(0.9500)
State 12	-1.8396*
	(0.9626)
State 13	-0.8189
	(0.8684)
State 16	-1.1811
	(0.8878)
State 18	-2.0620**
	(0.9762)
State 20	0.1912
	(0.9257)
State 21	-0.4087
	(0.9035)
State 22	-0.3108
	(1.0551)
State 24	-0.0985
	(0.8862)
State 25	-0.0730
	(0.9875)
State 30	-0.2488
	(0.8754)
Constant	0.0671
	(1.1768)
Observations	484
Standard errors in parentheses	

3.4.4 Relationship between quality and aggregate health outcomes

To test whether structural quality is related to health outcomes, an analysis using morbidity prevalence, defined as the proportion of individuals that were reported as sick in a 4-week period as a health outcome was implmented. This correlation analysis while it is not measuring causality, could provide a validation to the structural quality approach, if evidence that it is actually related to health is presented. Data from households surveyed in the same period that the data collection for quality at health facilities, and in the localities served by the facilities were used.

Individual data was aggregate at the locality level in order to estimate the correlation with structural quality. Ordinay least squares models were estimated using the quality index as a continuous variable, and order probit used to estimate the correlation using the 4 proposed categories of the index. The morbidity prevalence was generated for total population and 0 to 4, 5 to 9, 10 to 14 and 15 to 20 years-olds.

As reported in tables 35 & 36, when used as a continuous variable, there is a negative correlation between morbidity prevalence and the structural quality of services for individuals from 5 to 9 and 10 to 14, and marginal significant for the entire population. When analyzed as a categorical variable, the correlation is only shown in the 10 to 14 years.

Table 32: Correlation between morbidty prevalence and structural quality index at the locality levela

VARIABLES	All	ALL	0 to 4	0 to 4	5 to 9	5 to 9	10 to 14	10 to 14	15 t 19	15 t 19
Structural quality index	-0.00	**-0.01***	-0.00	-0.00	**-0.01***	**-0.01****	**-0.01****	**-0.01****	-0.01	-0.01
	(0.00)	**(0.00)**	(0.01)	(0.01)	**(0.01)**	**(0.01)**	**(0.00)**	**(0.00)**	(0.00)	(0.00)
Average SES		0.02***		0.04***		0.03***		-0.01		0.02***
		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)
Constant	0.11***	0.07***	0.17***	0.11***	0.11***	0.06***	0.09***	0.11***	0.07***	-0.00
	(0.00)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.03)	(0.00)	(0.02)
Observations	483	483	478	478	480	480	482	482	482	482
R-squared	0.00	0.04	0.00	0.02	0.01	0.04	0.01	0.13	0.00	0.12

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

[a] includes also provider and state variables, with interactions

Table 33: Correlation between morbidty prevalence and structural quality categories at the locality levela

VARIABLES	All	ALL	0 to 4	0 to 4	5 to 9	5 to 9	10 to 14	10 to 14	15 t 19	15 t 19
Morbidity prevalence	-0.97	-1.41	-0.07	-0.13	-0.27	-0.73	**-1.21****	**-1.56****	-0.86	-1.15
	(0.74)	(0.91)	(0.35)	(0.38)	(0.46)	(0.52)	**(0.58)**	**(0.63)**	(0.68)	(0.75)
Average SES		0.46***		0.43***		0.45***		0.42***		0.46***
		(0.12)		(0.12)		(0.12)		(0.12)		(0.12)
Observations	483	483	478	478	480	480	482	482	482	482

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

[a] includes also provider and state variables, with interactions

6.5 Discussion

As presented in the present chapter, there is significant heterogeneity in structural quality among primary care facilities serving rural poor localities in Mexico, which constraint the capacity of these facilities to provide effective health services. This constraint to health capital accumulation is strengthened by the fact that there is a positive correlation between quality and the average SE level of households in the locality (i.e., localities with households in better conditions also have better quality facilities). This situation is increasing the constraints on households in the poorest localities.

The analysis reported here use morbidity prevalence correlation with the estimated structural quality index as a validation on the relevance of such measure. The results suggest that structural quality matters, as quality framework propose. Lower the structural quality, lower the capacity of health services to produce health.

This study is the first large analysis of the structural quality of primary health services in Mexico, thus provide relevant empirical evidence of the quality of primary care in the country. Also, by correlating the proposed index with a measure of health outcomes provided evidence on the potential gains of investments on quality: at least for primar health units in rural Mexico, youth children are potentially the group that could be more beneficed by improvements in quality.

The structural quality of these primary health services could be viewed as a measure of the ability of these facilities to translate utilisation into health capital. This issue is relevant because development strategies, such as conditional cash transfer programmes like the Mexican Oportunidades, assume that increasing health services utilisation will increase human (health) capital accumulation, which will then result in socioeconomic mobility. If, as reported here, the quality of the facilities were not meeting the minimum structural conditions that are expected to effectively improve health, there would be a major barrier to development.

In particular, the results reported here highlight the fact that health services that serve Oportunidades households in rural Mexico lack important human and material resources, and that this deficiencies are correlated with low health

outcomes. The current structure of the visited facilities is insufficient to provide adequate treatment and care for their users according to Mexican official standards. Even if Oportunidades is successful in increasing health services utilisation among poor families with a high risk of intergenerational transmission of poverty, there is no guarantee that this will actually increase their health capital.

Half of the visited facilities have neither the necessary infrastructure nor the necessary supplies for childbearing; only 40% have a delivery room, and less than 10% possess ultrasound equipment. The use of the Papanicolaou smear, which is necessary for the appropriate detection of cervix and uterine cancer, is performed in only 70% of the clinics. About 25% of the units do not apply tests to measure glucose levels, and only 10% have glycosylated haemoglobin tests, which are needed to monitor diabetes treatments.

In general, the visited clinics had a reduced ability to offer appropriate health services for the users and face a crucial shortage of basic supplies. In a country with a high prevalence of anaemia and diabetes, the clinics are not equipped for the detection and follow-up of these conditions, which makes it impossible to prevent complications.

It is important to mention that are limitations to this analysis. As discussed in the methods section, there were some missing observations, although the sample of facilities comprises a significant proportion of the total sample. The quality index is a proxy measure for a complex concept, quality. Quality is a challenging to measure concept, and defining measures for structural quality is complex. Nevertheless, the proposed index is conceptually similar to other studies. (Gilson, Magomi et al. 1995; Peabody, Gertler et al. 1998; Meyer and Massagli 2001; Mariko 2003)

Deficiencies in structure point to important challenges in the quality of health services that could result in sub-optimal care. Failing to promote the effective accumulation of health capital would in turn affect the potential for socioeconomic mobility. Although health is one element of the human capital accumulation

process, it is a necessary but not sufficient condition. Investment in the quality of health services is actually an investment in development, as health services are a key element in socioeconomic mobility.

6.6 References

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6.7 Annex 1

Table 34. Minimum Supplies Needed by the Units.

Type of Unit	BM[b]	CS[a]	HR[d]	HC[e]	CSRD[f]	CSRC[g]		UMR[h]	UM[i]	CSU[j]			
N	4	31	2	14	132	30	16	148	11	2	2	2	**2**
Staff teams						2	3			2	4	5	**12**
Infrastructure for Patient Care													
Consulting Room	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Nursing Room			X	X		X	X	X		X	X	X	**X**
Waiting Room			X	X	X	X	X	X		X	X	X	**X**
Workshop Rooms	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Storage Area				X									
Cold Net Medicines													
Cold Net Vaccines	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Birthing Room	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Staff Bathroom			X	X				X					
Patient bathrooms			X	X				X					**X**
Shared Bathrooms	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Pharmacy			X	X		X	X	X		X	X	X	**X**
Nurse's station	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Expulsion room			X	X		X	X	X		X	X	X	**X**
Training Area			X	X	X	X	X	X		X	X	X	**X**
Dorms			X	X				X					
Storage Room for DB			X	X									
Emergency Room			X	X				X					
Operating Room			X	X									
Laboratory AC			X	X								X	**X**
Immunisation Room	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Cleaning Room			X	X	X	X	X	X		X	X	X	**X**
Medical Equipment Infrastructure													
Ambulance													
Filing Cabinets			X	X		X	X	X		X	X	X	**X**
Vacuum AMEU			X	X		X	X	X		X	X	X	**X**
Steriliser													
Weight scale for children	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Infantometer	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Adult weight scale	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Stadimeter	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Baumanometer	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Stretcher													
Oxygen cylinder			X	X				X					
Metre measurement tape	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Containers	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Doppler													
Minor Surgery	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Electrocardiogram			X	X									
US Equipment			X	X		X	X	X		X	X	X	**X**
Radiology Equipment			X	X						X	X	X	**X**

Stethoscope	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Stethoscope Pinar	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Washer	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Mayo Table			X	X		X	X	X		X	X	X	**X**
Microscope			X	X						X	X	X	**X**
Ophthalmoscope	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Otoscope	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Refrigerator	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Visual Agud Table													
Thermometer	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Tococardiograph			X	X		X	X	X		X	X	X	**X**
Clock													
Oral Serum	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Med Reg Book													
Vaccine Reg Book	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Medical Material													
Tongue depressor	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Alcohol	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Cotton	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Benzal	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Condoms	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Mouthcovers			X	X		X	X	X		X	X	X	**X**
DIU	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Vaginal Mirror			X	X		X	X	X		X	X	X	**X**
Dissecting Kit			X	X		X	X	X		X	X	X	**X**
Gauze	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Gloves	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Iodine	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Lubricating Jelly													
Liquid Soap													
Hand soap	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Syringe	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Juego instrumental	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Bed linens			X	X		X	X	X		X	X	X	**X**
Punzocat			X	X									
Operating robes			X	X									
Sonda			X	X		X	X	X		X	X	X	**X**
Sonda Foley			X	X		X	X	X		X	X	X	**X**
Needles and thread			X	X		X	X	X		X	X	X	**X**
Adhesive tape	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Towels	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Glucose Strips			X	X		X	X	X		X	X	X	**X**
Urine Strips			X	X		X	X	X		X	X	X	**X**
Thermo													
Disposable Towels													
Vaccine Container			X	X		X	X	X		X	X	X	**X**
Elastic Wraps	X	X	X	X	X	X	X	X	X	X	X	X	**X**

Venoset			X	X		X	X	X		X	X	X	**X**
Collecting Cups			X	X									
Medicines													
***Acetylsalicylic* acid**	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Paracetamol tab													
Paracetamol sol													
Metamizole *sodium*			X	X				X					
Lidocaine sol iny			X	X	X	X	X	X		X	X	X	**X**
Chlorpheniramine tab	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Chlorpheniramine jar	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Propranolol			X	X	X	X	X	X		X	X	X	**X**
Captopril			X	X				X					
Nifedipine caps			X	X				X					
Metoprolol													
Hidroclorotiazide													
Al/Mg			X	X	X	X	X	X		X	X	X	**X**
Ranitidina			X	X				X					
Butilnioscina iny			X	X	X	X	X	X		X	X	X	**X**
Albendazole tab			X	X				X					
Albendazole susp			X	X				X					
Metronidazole tab			X	X	X	X	X	X		X	X	X	**X**
Metronidazole susp			X	X	X	X	X	X		X	X	X	**X**
Glibenclamide			X	X	X	X	X	X		X	X	X	**X**
Metformin													
Insulin			X	X	X	X	X	X		X	X	X	**X**
Trimetopri tab			X	X	X	X	X	X		X	X	X	**X**
Trimetopri susp			X	X	X	X	X	X		X	X	X	**X**
Bencilpenicilina 1			X	X	X	X	X	X		X	X	X	**X**
Bencilpenicilina 2			X	X	X	X	X	X		X	X	X	**X**
Bencilpenicilina 3			X	X	X	X	X	X		X	X	X	**X**
Benzidine													
Dicloxacillin cap			X	X				X					
Dicloxacillin susp			X	X				X					
Ampicillin tab			X	X	X	X	X	X		X	X	X	**X**
Ampicillin susp			X	X	X	X	X	X		X	X	X	**X**
Eritromicina tab			X	X	X	X	X	X		X	X	X	**X**
Eritromicina susp			X	X	X	X	X	X		X	X	X	**X**
Chloramphenicol cap			X	X	X	X	X	X		X	X	X	**X**
Amoxicillin susp			X	X				X					
Amoxicillin cap			X	X				X					
Chloramphenicol sol			X	X	X	X	X	X		X	X	X	**X**
Chloramphenicol ung			X	X	X	X	X	X		X	X	X	**X**
Neomycin			X	X				X					
Salbutamol jar			X	X	X	X	X	X		X	X	X	**X**
Ambroxol			X	X				X					
Benzyl	X	X	X	X	X	X	X	X	X	X	X	X	**X**

Zinc oxide	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Lindane													
Clioquinol								X					
Miconazole			X	X	X	X	X	X		X	X	X	**X**
Folic acid 1			X	X				X					
Folic acid 2			X	X				X					
Bisoprolol fumarate tab			X	X	X	X	X	X		X	X	X	**X**
Bisoprolol umarato susp			X	X	X	X	X	X		X	X	X	**X**
Levonorgestrel	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Desogestrel	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Medroxyprogesterone	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Enanthate	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Male Condoms	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Glucose @l 5%			X	X	X	X	X	X		X	X	X	**X**
NaCl 0.9%[3]			X	X				X					
Sol Hartman			X	X				X					
Electrolytes	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Streptomycin			X	X	X	X	X	X		X	X	X	**X**
Isoniazid			X	X				X					
Sabin	X	X	X	X	X	X	X	X	X	X	X	X	**X**
BCG	X	X	X	X	X	X	X	X	X	X	X	X	**X**
DPT[2]	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Tetravalent	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Triple viral	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Measles	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Tetanus toxoid	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Complement - child	X	X	X	X	X	X	X		X	X	X	X	**X**
Complement - woman	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Services offered to the outpatient population													
Biopsy			X										
Caesarean Section			X	X		X	X	X		X	X	X	**X**
Minor Surgery			X	X									
Dental consultation			X	X		X	X	X		X	X	X	**X**
Consultation - adult	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Consultation - child	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Consultation – emb	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Nutrition monitoring	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Newborn care	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Labour and Child birth			X	X		X	X	X	X	X	X	X	**X**
Punctures			X	X									
Ultrasound			X	X		X	X	X		X	X	X	**X**
Emergencies			X	X				X					
Vaginal cytology			X	X	X	X	X	X		X	X	X	**X**
Microbacterial culture			X	X								X	**X**
Syphilis detection			X	X								X	**X**
Electrocardio				X								X	**X**
GS and Rh			X	X								X	**X**

Glucose levels			X	X								X	**X**
Haemoglobin levels			X	X								X	**X**
Hemos glucoside			X	X								X	**X**
Urine tests			X	X								X	**X**
Blood chemistry			X	X								X	**X**
Ultrasound			X	X								X	**X**
Urine test			X	X								X	**X**
Sample taking			X	X								X	**X**
Skin test			X	X								X	**X**
X-rays			X	X								X	**X**
Bleeding time			X	X								X	**X**
Uroculture			X	X								X	**X**
Papanicolaou	X	X	X	X	X	X	X	X	X	X	X	X	**X**
Labour and childbirth			X	X		X	X	X		X	X	X	**X**
Dental practice			X	X									
Ophthalmological revision			X	X				X					
Healthcare workshops	X	X	X	X	X	X	X	X	X	X	X	X	**X**

Note: The following types of units are not considered, as they include only one observation (complete table in Appendices): "Consultorio Periférico SSA", "Urban Medical Unit", "3-nuclei Urban Health Centre", "8-nuclei Urban Health Centre" and "11-nuclei Urban Health Centre".

MB = Mobile Brigade, HH = Health House, RH = Rural Hospital, CH = Community Hospital, DRHC = Disperse Rural Health Centre, CRHC = Concentrating Rural Health Centre, MU = Mobile Unit, UMU = Urban Medical Unit, RMU = Rural Medical Unit, UHC = Urban Health Centre.

[a] For an HH, the necessary spaces are considered according to the architectural layout (consultation room, delivery room, general bathroom, lavatory, etc.). A treatment room is defined as one in which minor treatments are performed and alcohol, cotton, benzyl chloride, gauzes, iodine, soap, sutures, containers, adhesive tape, and bandages are available. For their role in vaccination campaigns, a vaccine cooling box, vaccines, and syringes are included. Consultation is available for adults, children, and pregnant women, and therefore, basic diagnostic equipment is required, as well as a scale and a stadiometer. Because of the activities required for attention to newborn babies and child growth monitoring, the following are required: a paediatric scale, infantometer, thermometer, oral electrolytes, and nutritional monitoring services and child complement. For pregnancy care, a metric tape, foetal stethoscope, and complement are required for women. Necessary instruments for mobile brigades are required, as well as condoms and IUDs for family planning. Vaginal cytology and Pap tests are necessary for cancer detection.

[b] Same results established by the Health Houses, where the mobile brigades or units arrive.

[e] CH supplies according to the equipment guide provided by CENETEC.

[d] Same requirements established as those for a Rural Medical Unit in addition to those established in the Operation Rules of the IMSS-*Oportunidades* Program. For RH, the healthcare workshops are equivalent to social work. RHs attend to labour and childbirth.

[f,g,j] In accordance with the MIDAS and CENTEC equipment guide for health centres.

[h] Equipment is established according to that set by the central office of the Evaluation Unit of the IMSS-Oportunidades Program.

[i] The same equipment is established as for HH.

Assumptions:

1. **Training rooms are related to multiple service areas for the SSA and to preventive medicine for the IMSS.**
2. **All types of SSA units require a trash bin, bathroom, towels, and soap. Three types of bathrooms were considered (personnel, patients, and general), as well as the presence of towels and disposable towels and hand and liquid soap.**
3. **All types of health units (IMSS or SSA) have a consultation room and a waiting room and provide consultations to adults, children, and pregnant women.**
4. **In the case of SSA units requiring diagnostic equipment, an ophthalmoscope and an otoscope were considered.**
5. **A waste bin indicates a storage room or space for dangerous bio-infectious residues.**
6. **Units that require a thermometer case are assumed to have a thermometer.**
7. **The vaccine/treatment area requirement is related to having a treatment room and a vaccination room.**
8. **The minor surgery requirement is related to having minor surgery equipment, minor surgery service, emergency care, and an emergency room.**

9. **Requirements such as a scalpel or certain types of forceps are related to dissection.**
10. **The emergency childbirth requirement is related to childbirth and childbirth service.**
11. **The dental consultation requirement is related to dental consultation and odontology or dental practice.**
12. **The file registry requirement is related to the filing cabinet used for medical files.**
13. **All types of ENCEL instrument analyses were considered for urban health centres, as this type of unit requires laboratories for several clinical analyses.**
14. **X-rays performed in urban health centres are related to X-ray services and radiology equipment.**
15. **Cleaning is related to the cleaning room.**
16. **Clean clothes are related to bed linen in the case of units that require an admission area.**
17. **The presence of an admission area is determined by units that require oxygen, have an I.V. stand and mount or contain an observation area.**
18. **Units that require emergency childbirth service are related to the attention and care of newborn infants.**
19. **Room is related to having a dormitory.**
20. **Antiseptic germicide is related to alcohol, which is necessary in every unit type.**
21. **Lancet is related to the instrument puncture variable.**
22. **In the case of an IMSS-*Oportunidades* RMU, the adult bedpan requirement is related to admission area, oxygen, and bed linen.**
23. **Children complement and nutrition monitoring are considered equivalent to having a nutrition education centre.**