

Health technology assessment in Mexico

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Objectives: The history of health technology assessment (HTA) in Mexico is examined, starting with the efforts to incorporate this topic into the policy agenda and culminating with the recent creation of a specialized public agency.

Methods: Information was gathered through a bibliographic search and interviews with actors involved in HTA in Mexico.

Results: HTA efforts were developed in Mexico since the mid-1980s with the participation both of academics and of policy makers, a relationship that eventually led to the creation of the Center for Technological Excellence within the Ministry of Health.

Conclusions: Institutionalization of HTA in resource-constrained settings requires the development of a critical mass of researchers involved in this field, the implementation of information efforts, and the establishment of strong relationships between HTA experts and policy makers.

Keywords: Health technology assessment, Mexico, History

This study discusses the evolution of health technology assessment (HTA) in Mexico, starting with the initial efforts in the mid-1980s to incorporate this topic into the public agenda and culminating with the recent creation in the Ministry of Health (MoH) of an agency devoted to improving the acquisition, management, and dissemination of medical technologies. The first part of this study presents a brief description of the health situation in Mexico. Parts 2 and 3 discuss the origins and present status of the Mexican health system. Finally, part 4 recounts the history of HTA in Mexico. The basic conclusion of this study is that it is possible to institutionalize HTA procedures in developing countries. However, efforts in several areas are required, including the development of a critical mass of researchers involved in the evaluation of health technologies, the implementation of information efforts in this field, and the establishment of strong relationships between HTA experts and policy makers.

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HEALTH TRANSITION IN MEXICO

The recent demographic development of Mexico is characterized by an important increase in life expectancy, mostly explained by a decline in infant mortality, and by a fast reduction in fertility. These shifts are generating an aging process, which implies an increasing proportion of adults 65 years of age and older in the population structure. Children under 5 will account for only 6.6 percent of the total population in 2050, while senior adults will account for 11.8 percent of the population in 2030 and 21.2 percent in 2050.

The increase in life expectancy and the growing exposure to risks related to unhealthy life styles are modifying the main causes of disease, disability, and death. Mexico is going through an epidemiological transition characterized by an increasing predominance of noncommunicable diseases and injuries. In 1950, approximately 50 percent of all deaths in the country were due to common infections, reproductive events, and ailments related to malnutrition. Today, these problems represent less than 15 percent of total deaths, while noncommunicable diseases and injuries are now responsible for more than 85 percent of total deaths. This

new profile is exerting unprecedented pressure on the health system, because noncommunicable diseases are mostly chronic and usually require expensive and complex services with a high technological content.

BRIEF HISTORY OF THE MEXICAN HEALTHCARE SYSTEM

The origins of the modern Mexican health system date back to 1943, when three important institutions were created: the MoH, the Mexican Institute for Social Security (IMSS), and Mexico's Children Hospital (the first of what are now twelve National Institutes of Health). The IMSS was created to tend to the needs of the industrial work force (in 1960, a similar institution for federal civil servants was created, the Institute for Security and Social Services for Government Employees [ISSSTE]), while the MoH was assigned the responsibility of caring for the urban and rural poor.

Through the middle decades of the past century, the model of healthcare delivery increasingly became hospital-based and specialty-oriented, leading to an important increase in the costs of care and limited access to services for a large portion of the rural poor. Health needs were also changing, as described above.

In the search for ways to improve access and quality of care, a major reform was launched in 1983. A Constitutional amendment establishing the right to the protection of health and a new Health Law were approved. Health services for the uninsured population were decentralized to state governments. Finally, coverage of essential services was expanded through a program guided by primary health care, which suggested a greater emphasis on preventive actions, a proper mix of technologies, and the promotion of community participation.

In the 1990s, several studies revealed that more than 50 percent of total health expenditure in Mexico was out-of-pocket. This was due to the fact that half of the population lacked health insurance. These high levels of out-of-pocket expenditure were exposing Mexican families to catastrophic financial episodes. In 2000, approximately three million Mexican households suffered catastrophic health expenditures. Not surprisingly, Mexico performed poorly on the comparative analysis of fair financing developed by the World Health Organization as part of the *World Health Report 2000* (18). These results prompted the development of additional analysis that showed that catastrophic and impoverishing health expenditures were concentrated among the poor and uninsured households.

The products of this analysis were used in 2003 to promote a legislative reform that established the System for Social Protection in Health. This system is increasing public resources by a full percentage point of GDP over a period of 7 years to provide health insurance through a new scheme called *Seguro Popular* to all those ineligible for social

security: the self-employed, those out of the labor market, and those working in the informal sector of the economy (8).

THE MEXICAN HEALTHCARE SYSTEM TODAY

The Mexican health system includes a public and a private sector. The public sector comprises social security institutions (IMSS, ISSSTE, social security institutions for oil workers and the armed forces), *Seguro Popular*, and those institutions offering services to the uninsured population (MoH, State Health Services [SESA], and the IMSS-Oportunidades Program [IMSS-O]). These institutions own and run their health facilities and employ their own staff, except for *Seguro Popular*, which buys services for its affiliates from the MoH and the SESA. The private sector includes facilities and providers offering services mostly on a for-profit basis.

Social security institutions are financed with contributions from the government, the employers, and the employees. The MoH and the SESA are financed with federal and state government resources, coming from general taxation, and small contributions that users pay when receiving care. The IMSS-O, which is directed to the rural poor, is financed with federal resources, although the program is operated by IMSS. Finally, *Seguro Popular* is financed with federal and state government contributions and family contributions, with total exemption for those families in the bottom 20 percent of the income distribution. The services of the private sector are financed mostly with out-of-pocket payments.

In general terms, those affiliated to social security institutions (approximately 49 million persons in 2006) have access to a broad, but not explicitly defined, package of health services, including drugs. Those affiliated to the *Seguro Popular* (approximately 16 million in 2006) have access to 255 essential interventions and the respective drugs. In addition, they have access to a package of eighteen high-cost interventions for the treatment of acute neonatal conditions, cancer in children, cervical and breast cancer, and HIV/AIDS, among others. The uninsured population has access to variable benefits, with families living in large urban areas having access to a relatively large package of services, while the uninsured rural poor have more limited benefits. Thanks to the 2003 reform, by the end of 2010, the entire population will be insured, thus bringing Mexico closer to the goal of universal coverage.

Total health expenditure in Mexico was 6.5 percent of GDP in 2006, well below the Organisation for Economic Co-operation and Development (OECD) average (9 percent) and below the Latin American average (6.8 percent), but up from 5.5 percent in 2000. Mexico's public expenditure on health as a percentage of total health expenditure in 2006 was 47.1 percent, up from 40.4 percent in 1990. Private expenditure accounts for 52.9 percent of total health expenditure

in Mexico. Ninety-five percent of private health expenditure is out-of-pocket. The remaining 5 percent is paid as private insurance premiums.

The Mexican health system includes 23,269 health units, not counting the medical offices of the private sector; 4,103 are hospitals, and the rest are ambulatory clinics.

In 2005 there were 1.8 doctors per 1,000 population in Mexico, well below the OECD average (3.0) and that of other Latin American countries, such as Argentina (3.0) and Uruguay (3.6). The availability of nurses in 2005 (2.2 nurses per 1,000 population) was also below the OECD average of 8.6.

Regarding specialty medical equipment and procedures, Mexico has 360 computed tomography scanners (CTs), for a rate of 3.6 CTs per million persons. This is the lowest figure for OECD countries, which on average have 20.6 CT per million. Mexico has 139 radiation therapy units, for a rate of 1.3 per million population, in contrast with the OECD average of 6.2 units per million. Finally, Mexico also presents the lowest number of mammogram machines per capita of all OECD countries, with 4.5 per million persons. These figures reflect a chronic problem of underinvestment in medical technology that is being confronted through the recent design and implementation of a Master Plan for Medical Equipment within the MoH.

Public health services are provided by the MoH to all the population. These services include health promotion, risk control, and disease prevention activities, including vaccination and epidemiological surveillance. The MoH is also responsible for the generation of information on health conditions, resources and services, and for the evaluation of the national and state health systems, health institutions, and health policies, programs, and services. The Federal Commission for Protection against Health Risks (COFEPRIS) was created in 2001 with the mission of regulating products and services related to health, including drugs and medical equipment, occupational and environmental exposures, basic sanitation, food safety, and health-related advertisement.

HISTORY OF HTA IN MEXICO

The history of HTA in Mexico dates back to the late 1970s. Its main promoter was Dr. José Laguna, a well-known biochemist who was Dean of the School of Medicine of the National Autonomous University of Mexico (UNAM) between 1971 and 1976. When he was appointed Deputy Minister of Health in 1978, he decided to strengthen health services research in Mexico. As part of this effort, a group of Mexican physicians headed by Dr. Laguna visited the National Center for Health Services Research in Washington, DC and organized, in Querétaro, Mexico, in July of that same year, an international "Seminar on Health Services Research," where the topic of health technology assessment was discussed (3). This seminar marks the beginning of the history that will be recounted in the rest of this study.

In those days, Dr. Laguna came across several reports from the US Office of Technology Assessment (OTA) and decided to visit its headquarters. In this trip, he was accompanied by another important actor of HTA in Mexico, José Rodríguez-Domínguez, a public health specialist once described by Avedis Donabedian as "a talent hunter of outstanding tenacity and skills" (5).

Because of his early interest in HTA, Dr. Laguna was invited to attend the landmark conference sponsored by the Rockefeller Foundation that took place in Bellagio, Italy in November of 1980. The main product of this conference was the now famous book *Resources for Health: Technology Assessment for Policy Making* (2).

After leaving the Ministry of Health, in 1980, Dr. Laguna was appointed Director of the Center for Educational Technology for Health (CEUTES) at UNAM. There he created a Department of Evaluation of Educational Technologies for Health, which was headed by Dr. Rodríguez-Domínguez. In this department, the first national survey on health technology in Mexico was designed and implemented. The results of this survey, whose purpose was to evaluate the pattern of adoption and use of seventeen medical technologies, were published in 1984 (14;16). That same year, another study on the role of medical technologies in Mexico was published (15). These studies highlighted the fact that the purchase of medical equipment in Mexico had ignored the need for an infrastructure that could guarantee not only its adequate installation, but also its rational dissemination, and its effective and efficient maintenance and operation. The basic conclusion was the need to develop criteria to regulate the acquisition, use, and dissemination of new medical technologies in Mexico. These were probably the first publications on HTA produced by Mexican researchers, and they signal the growing interest in health technology management in Mexico.

In 1984, the first National Health Survey was implemented in Mexico, and it included a module on science and technology thanks to which an inventory of scientific and technological institutions and activities was built. This diagnostic exercise led to the creation of the Inter-institutional Commission on Health Research. The mission of this commission included the coordination of the efforts of the health and education sectors to rationalize the process of research and technological development. During those years, measures were also taken to control and regulate healthcare inputs through the design of "essential input lists" (medical devices, supplies, implants, prostheses, and drugs).

A year later, as a recognition to his early interest in HTA, Dr. Laguna was elected to the board of the International Society for Technology Assessment in Health Care (ISTAHC) at its inaugural meeting in Denmark in 1985. At the same time, he became a member of the Editorial Board of the newly launched International Journal of Technology Assessment in Health Care and served it for many years.

That same year, Dr. Laguna was re-appointed Deputy Minister of Health and he continued supporting HTA activities. The group within the Ministry of Health that took over this important responsibility, organized around the Center for Technological Development and Applications, created in 1983, concentrated its activities on the supervision and maintenance of medical technologies.

As a corollary of this initial phase of HTA development in Mexico, a set of papers on this topic were published a few years later. One of them discusses a research strategy to integrate the evaluation of quality of care and HTA by studying technology clusters sufficiently integrated so as to constitute a comprehensive unit for the production of services, such as health centers or neonatal intensive care units (6). The other one describes the efforts of the MoH to strengthen research and technological development in the health sector (12).

In the 1990s, most of HTA activities implemented in Mexico were developed in academic contexts. Research projects were designed and implemented, and seminars were organized, most of them with the intention of influencing policy-decisions. Unfortunately they had modest policy impacts.

In November of 1991, the Mexican Health Foundation, the National Institute of Public Health, the Pan American Health Organization, and the University of Wisconsin organized a "Seminar on the Rational Use of Health Technologies." The basic conclusion of this seminar was the need to design strategies to promote the rational adoption and dissemination of medical technologies in Mexico. This conclusion was further developed in a study published in 1993 that stresses the need to build an inventory of medical technologies in Mexico (10). Other ideas discussed in this seminar were expanded in a study that anticipates the creation of an agency devoted to HTA (4):

There is a pressing need to designate a specific authority within the health sector to supervise and evaluate the cycle of technological incorporation. Above all, there should be a comprehensive view on acquisitions, taking into account not only price and sales conditions, but also further support services. There should be more emphasis on programs for preventive and corrective maintenance, and functional inventories should be made to keep track of the state of equipment and devices. Although much of what is needed to support technological development in health has already been put in place, more attention should be paid to the scientific assessment of technologies to make healthcare services more effective, efficient, and equitable.

In those days, a project on the supply of medical technology in Mexico was implemented (1). The final report noted that 95 percent of all medical technologies used in healthcare services in Latin America were imported. Medical equipment prototypes were primarily designed by agencies affiliated with large foreign firms and few national institutions and domestic firms had systematically attempted to develop local prototypes. The report also mentioned that only

23 percent of the firms selling medical devices in Mexico produced them; most of them were distributors of imported equipments and parts, and a small percentage provided installation and maintenance services.

As part of a comprehensive proposal for the improvement of the performance of the Mexican health system published in 1994 (7), a set of general recommendations on HTA designed by a team of researchers at the Mexican Health Foundations was disseminated (9). Four of those recommendations are particularly relevant: (i) to keep a national registry of medical technologies; (ii) to design a minimum set of procedures for the evaluation of medical technologies in the public sector that should be applied as a requisite for the acquisition of any technological innovation; (iii) to promote the creation of biomedical engineering units in second and third level hospitals to evaluate the acquisition, installation, operation, maintenance, and disposal of medical equipment; and (iv) to discuss the creation of a public agency specifically devoted to HTA.

The discussion and eventual approval of the North American Free Trade Agreement offered a unique opportunity to discuss the impact of free trade on health care. This was, in fact, the topic of a seminar organized by the National Academy of Medicine of Mexico and the U.S. Institute of Medicine which took place in Mexico City in March of 1995. Experts from Canada, Mexico, and the United States analyzed four critical issues for the future of trade in health services in North America: technology, human resources, quality of care, and health research. In the panel on the transfer of medical technologies, the problems confronted by Mexico in the adoption and dissemination of new technologies were discussed (13). Emphasis was placed on the absence of explicit criteria to select cost-effective technologies, the lack of personnel capable of operating novel equipments, and the purchase of multiple models of the same products that complicated maintenance procedures. These factors had resulted in an unproductive transfer of health technologies that could be aggravated with the expansion of free trade in the region.

Despite these efforts, by the end of the decade, the belief among those working in the HTA field was that the policy initiatives developed in Mexico were fading and that health technology was confronting a situation similar to that of the previous decade, when high cost medical technology was being imported without adequate evaluations due to the lack of a comprehensive HTA system, which includes, among other things, a critical mass of researchers in this area; a solid information system providing information on the quantity, type, and utilization of health technologies; and a public agency specifically devoted to HTA (11).

The turn of the century was particularly propitious for HTA. Many of the previous efforts developed in this area were capitalized by the new federal administration that took office in December of 2000.

Immediately after the turn of the century, in January of 2000, a "Forum on Health Technology Assessment" was

organized in Mexico City by the Médica Sur Foundation and the National Council on Science and Technology. A broad agenda was discussed, including intellectual property related to technological developments, the impacts in costs of the adoption of technological innovations, and the rational use of technology in biomedicine (17).

In 2001, a Program for the Evaluation and Management of Medical Technology was created at IMSS. The following year, an institutional inventory of relevant medical equipment was set up. In 2004, the Division of Health Systems of this social security agency joined the International Networks of Agencies for Health Technology Assessment (INAHTA).

In 2002, the Federal Commission for the Protection against Sanitary Risks (COFEPRIS) was created as an autonomous agency of the MoH with the mission of protecting the population against risks produced by the consumption or use of, among other things, water, food, beverages, drugs, and medical equipment. This agency is not involved in the evaluation of medical technologies, but it complements HTA through its regulatory role.

Finally, in January of 2004, the National Center for Technological Excellence in Health (CENETEC) was created as a specialized agency of the MoH with two basic purposes: (i) to generate accurate, pertinent, and relevant information on health technology to improve the provision of health care and the design and implementation of health policies; and (ii) to help rationalize the acquisition, adoption, management, and dissemination of medical technologies at the local, regional, and national levels. In addition to these core functions, CENETEC has organized several national forums on medical technologies and recently created the Mexican Network for Health Technology Assessment with representatives of all major institutions and agencies involved in HTA.

CONCLUSION

The Mexican case is a good example of what developing countries need to do to institutionalize HTA procedures. Undoubtedly, the first requirement is to create a broad local perception of the need to assess health innovations. In this sense, the pioneering work of Drs. Laguna and Rodríguez-Dominguez cannot be underestimated. They were also part of a small group of public health leaders who strengthened health services research in Mexico and who stimulated young Mexican physicians to study public health abroad.

Together, this group of mentors and this group of young public health professionals created, in 1987, the National Institute of Public Health (INSP), where most of the academic projects around HTA have been developed, in most cases in collaboration with public institutions providing health care, such as the MoH and IMSS. Thanks to these efforts a critical mass of researchers interested in HTA was built and this mass, in turn, prompted the development of the field. Researchers were trained not only at INSP, but also at the Ibero-American University and the Autonomous

Metropolitan University, which created their own schools of Biomedical Engineering in 1973 and 1974, respectively.

Finally, the link between researchers and policy makers is crucial. When this relationship faded in the mid-1990s, HTA efforts in Mexico declined. However, when the relationship was strong, as it happened in the mid 1980s and early 1990s, and then again in the initial years of the 21st century, the impact of HTA increased to the point of allowing the creation of a specialized agency.

In the end, the purpose of HTA is to improve the health conditions of a society through the rational application of knowledge to the solution of the most pressing problems. Mexico is firmly on the path toward this enlightened aspiration.

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