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ORIGINAL ARTICLE | EMERGENCY OBSTETRIC CARE

Defragmenting the Health Care System in Mexico: Universal Access for Obstetric Emergencies

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ABSTRACT

Background and Objectives: This article aims to analyze how the needs of Mexican women requiring emergency obstetric care (EmOC) can be fully met through initiatives such as the General Agreement on Inter-Institutional Collaboration for Emergency Obstetric Care (the *Agreement*). We compared EmOC-accredited facilities operating under the *Agreement* with facilities outside the *Agreement* which, although not accredited, provide their affiliates with EmOC services. Also, to determine whether Mexico could provide five EmOC facilities as proposed by the United Nations (UN), United Nations Population Fund (UNFA), and United Nations Children's Fund (UNICEF).

Methods: Based on an observational, descriptive, cross-sectional design, we analyzed the *Agreement* inter-institutional strategy within four different scenarios in order to verify whether Mexico was in compliance with UN recommendations on EmOC availability, namely,: five facilities, with at least one offering comprehensive services, per 500,000 inhabitants.

Results: Taking into account all facilities in the Mexican health care system, we found that Mexico offered 75% of the required facilities and was therefore 25% short of compliance. According to data on hospital discharges, 734,438 cases of obstetric emergencies (OEs) were registered in Mexico in 2013, the vast majority of which were assisted by facilities unaccredited for that function. Meanwhile, the 466 accredited facilities, all operating under the *Agreement*, served a negligible proportion (0.07%) of these patients.

Conclusion and Implications for Translation: The *Agreement* would undoubtedly reach its potential as a vehicle for universal EmOC coverage were its field of action not restricted to such a small number of services for women. The Mexican health care system is faced with the double challenge of increasing institutional coverage and upgrading installed EmOC infrastructure.

Keywords: • Medical Emergency Services • Mexico • Medical Assistance • Hospitalization • Health Regulation • Agreements

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RESUMEN

Antecedentes y Objetivos: Este artículo tiene como objetivo analizar como las necesidades de la mujeres que requieren atención de emergencia obstétrica (AEO) pueden satisfacerse plenamente a través de iniciativas como el Acuerdo General de Colaboración Interinstitucional para la Atención de Emergencia Obstétrica (el Acuerdo). Comparamos las instalaciones acreditadas por AEO que operan bajo el Acuerdo con las instalaciones fuera del Acuerdo que, aunque no están acreditadas, brindan a sus afiliadas servicios de AEO.

Métodos: Con base en un diseño observacional, descriptivo y transversal, analizamos la estrategia interinstitucional del Acuerdo dentro de cuatro escenarios diferentes para verificar si México cumplía con las recomendaciones de las Naciones Unidas (ONU) sobre disponibilidad de EmOC: cinco instalaciones, con al menos uno que ofrezca servicios integrales por cada 500, 000 habitantes.

Resultados: Teniendo en cuenta todas las instalaciones en el Sistema de Salud Mexicano, encontramos que México dispondría del 75% de las instalaciones requeridas y, por lo tanto, no se cumplía en un 25%. Según datos de egresos hospitalarios, en 2013 se registraron 734, 438 casos de emergencias obstétricas (OE) en México, la gran mayoría de los cuales fueron atendidos por centros no acreditados para esa función. Mientras tanto, las 466 instalaciones acreditadas, todas operando bajo el Acuerdo, atendieron una proporción insignificante (0.07%) de estas pacientes.

Conclusión e Implicaciones Para La Traslación: El Acuerdo alcanzaría indudablemente su potencial como vehículo para la cobertura universal de AEO si su campo de acción no se limitara a un número tan pequeño de servicios para mujeres. El Sistema de Salud Mexicano se enfrenta al doble desafío de aumentar la cobertura institucional y mejorar la infraestructura instalada de AEO.

Palabras clave: • Cuidados de Emergencia obstétrica de Emergencia • México • Atención médica • Hospitalización • legislación sanitaria • Convenios.

1. Introduction

1.1. Background of the Study

The late 1990s marked a global turning point in the maternal health care paradigm, with Mexico falling in line at the turn of the millennium. During those years, the number-one priority of maternal health care shifted from its traditional focus on antenatal care to the provision of timely treatment for obstetric emergencies (OEs). Numerous countries embraced the objective of offering women effective access to an emergency referral system 24 hours a day, seven days a week. An OE has been defined as "a health condition that threatens the life of a pregnant woman and/or her unborn child and requires immediate medical care often entailing surgery."[1] The leading cause of OE in Mexico is obstetric hemorrhage in the prenatal, intrapartum and postpartum periods."[2] According to estimates, the average interval between the onset of an OE and death depends on the specific condition: two hours for postpartum hemorrhage, two days for eclampsia (hemorrhage during pregnancy) or obstructed labor, and six days for infectious diseases.

The shift in maternal health care practices mentioned above was promoted by international organizations including the United Nations (UN), the United Nations Population Fund (UNFPA), Averting Maternal Death and Disability (AMDD), the United Nations International Children's Emergency Fund (UNICEF) and the World Health Organization.[3,4] Mexico responded with a series of initiatives: in 2002, the Mexican Ministry of Health (MoH) launched the Fair Start in Life Program; in 2009, the National Center for Gender Equity and Reproductive Health introduced the Strategy for Progress in Reducing Maternal Death; and that same year, the MoH established the General Agreement on Inter-Institutional Collaboration for Emergency Obstetric Care (henceforth, the

Agreement).[5] The latter has been endorsed by the main public health institutions in Mexico, namely the Mexican Social Security Institute (*IMSS*), the *IMSS-Prospera* Program (*IMSS-P*) and the Institute of Social Security and Services for Government Workers (*ISSSTE*).

1.2. Objectives of the Study

The *Agreement* constitutes a pioneering strategy for achieving universal access to timely EmOC services entirely free of charge, whether or not patients are affiliated with a health insurance program. It is essential to regularly assess its progress towards this objective.

The purpose of this article is to analyze the opportunities offered by the *Agreement* and other similar instruments for meeting OE service demand in Mexico. We compared EmOC facilities participating in the *Agreement* (accredited for supporting OEs) with those operating independently (unaccredited). In an effort to provide information that might serve to strengthen EmOC in Mexico, this article discusses the challenges faced by the maternal health sector in meeting the UN Standard. Also, to determine whether Mexico could provide five EmOC facilities at least one comprehensive per 500,000 pregnant women as per UN advocacy.

1.3. Context

In order to obtain the services called for under the *Agreement*, OE patients need to request them or be referred by a health service provider to an *Agreement* facility. However, since 2011, the Observatory of Maternal Mortality in Mexico (OMM) has documented that neither users nor providers of health services are aware of the benefits and facilities available under the *Agreement.*[6,7,8]

EmOC services have been classified as basic or comprehensive.[9] Basic services are responsible for six functions: supplying antibiotics, supplying oxytocics, supplying anticonvulsants, parenteral administration of antihypertensives, providing human resources skilled in vaginal childbirth, and manual removal of placenta and retained products of conception. Hospitals and other facilities equipped with medical, nursing and auxiliary staff trained in obstetric care are obligated to offer these basic services. Comprehensive EmOC services must offer the six basic functions and also ensure available inputs and resources for the performance of blood transfusions and cesarean procedures. They are expected to be equipped with operating rooms and medical staff specialized in obstetrics/gynecology and anesthesiology. [10]

In 1992, the UN and other international organizations recommended that countries distribute their EmOC services per 500,000 inhabitants as follows: at least one comprehensive and four basic EmOC facilities with the capacity to offer quality services 24 hours a day, seven days a week, 365 days a year. In 2009, they raised the standard to five facilities, with at least one offering comprehensive services.

Mexico offers childbirth and EmOC services exclusively in secondary-care facilities, primarily hospitals; the only exceptions are a few rural health centers, and specifically in cases where patients are unable to reach a secondary-care facility in time for giving birth. [11,12] Our estimates for 2013 indicated that only 466 of the 1,141 health facilities in the public health sector were parties to the *Agreement*. Incorporation of facilities into the *Agreement* service network hinges on the political willingness of participating institutions to allow their inclusion in the MoH accreditation process.

EmOC-accredited facilities are classified into three levels of response capacity: high, medium and low, depending on the availability of their human resources, infrastructure, equipment and inputs. Response capacity also refers to the ability for transporting patients to facilities.

EmOC-accredited facilities with low response capacity (rudimentary rural hospitals) are those that provide basic services in rural settings but are not consistently able to ensure resources and infrastructure 24 hours a day, seven days a week. In most cases, their function is restricted to stabilizing OE patients and promptly referring them to the nearest facility with response capacity. The criterion for admitting these facilities into the *Agreement* service network generally concerns their strategic

location in sites where they are the only option for the delivery of EmOC services.

EmOC-accredited facilities with medium or high response capacity are equipped with human resources, infrastructure and inputs 24 hours a day, seven days a week, and are generally able to perform blood transfusions. One indispensable characteristic of facilities with high response capacity is the presence of intensive-care units for adults and/or newborns.

In comparing these three levels of response capacity in Mexico against the UN classification of EmOC facilities, we found that all 466 establishments in the *Agreement* excluded any primary-care facilities capable of performing the basic activities defined by the UN; as previously mentioned, OEs in Mexico are almost entirely supported by the hospital sector. Although accredited EmOC facilities meet both basic and comprehensive requirements with the three levels of response capacity, those rated as basic are occasionally limited as regards availability of human resources and blood transfusion services.

2. Methods

We conducted an observational and descriptive cross-sectional study in order to analyze the *Agreement* strategy within different scenarios. The objective was to verify whether Mexico was in a position to offer five EmOC facilities, at least one comprehensive, per 500,000 inhabitants, as recommended by the UN, the UNFPA and the UNICEF.[13] The scenarios included *Agreement* facilities accredited for providing EmOC services (a distinction awarded exclusively to hospitals in the *Agreement*) and public/private facilities providing EmOC services independently of the *Agreement* and, hence, without the relevant accreditation. In regard to the private sector, we considered only facilities endorsed by the National System for the Certification of Medical Care Establishments ("*Certification*").[14]

Certification is a MoH distinction awarded to secondary-care facilities that meet a set of standards for care quality and the safety of patients. Requirements relate to infrastructure, care processes and inputs. Certification is voluntary and applicable to public and private hospitals that request and merit this recognition. Because it guarantees quality, our analysis of private-sector facilities included only certified hospitals. *Accreditation*, on the other hand, was established by the MoH as a mandatory condition for its facilities when the *Seguro Popular* public insurance scheme was created. Certification and accreditation standards and requirements are comparable. When the *Agreement* was launched, the MoH devised an accreditation certificate for EmOC facilities. *Agreement* participants, which are all administered by the *IMSS*, the *ISSSTE* and the MoH, are required to undergo the accreditation process.

2.1. Study Variables and Analysis

The scenarios were distributed among the totality of EmOC facilities in Mexico according to the following characteristics:

(1) **Scenario 1 (accredited):** the 466 public facilities participating in the *Agreement,* all of them administered by the *IMSS*, *IMSS-P*, *ISSSTE* and the MoH;
(2) **Scenario 2 (accredited and unaccredited):** the preceding *Agreement* facilities in addition to 619 public facilities operating independently of the *Agreement,* also administered by the *IMSS*, *IMSS-P*, *ISSSTE* and the MoH;
(3) **Scenario 3 (accredited and unaccredited):** the 1,085 facilities in Scenario 2 along with 56 additional facilities operated by the remaining public-sector institutions: *Petroleos Mexicanos* (*PEMEX*), the Ministry of National Defense (*SEDENA*), the Ministry of the Navy (*SEMAR*) and state/municipal universities; and
(4) **Scenario 4 (accredited, unaccredited and certified):** all public facilities in Mexico in addition to 35 private facilities certified by the MoH.

It should be noted that the *Agreement* covers only 140 listed OE causes; its provisions indicated that others would be gradually incorporated. Based on MoH records for 2013, we performed a

comparative analysis of EmOC services delivered by the *Agreement* vs. non-*Agreement* facilities in Mexico. To this end, we set up three comparison groups based on coverage for OE causes: (a) number of women treated at *Agreement* facilities for the 140 OE causes on the *Agreement* list; (b) number of women treated at all other facilities for the same 140 OE causes; and (c) number of women treated for all existing OE causes in Mexico. We expressed the delivery of EmOC services as percentages in order to visualize the range of EmOC response levels.

2.2. Ethical Approval

Our study was approved by the Research Ethics Committee of the National Institute of Public Health. Data do not contain identifying or sensitive subject information; only official information available from seconday databases was consulted.

3. Results

In 2013, a total of 1,366 facilities offered secondary-care services in the Mexican public health sector, 1,141 of which were equipped with the necessary infrastructure and resources to support vaginal births, cesarean sections and OEs. The 466 facilities participating in the *Agreement* (MoH,2013) represented merely 41% of the public health care facilities with available EmOC infrastructure and resources. The remaining 675 facilities operating outside of the *Agreement* provided basic and comprehensive EmOC services without the relevant accreditation.

Table 1 illustrates the four scenarios developed to compare EmOC service availability in Mexico at the national and state levels with the international recommendations. Column A presents the ideal number of facilities; columns B, E, H and K, the actual numbers of facilities; columns C, F, I and L, the deficit in facilities reflected as percentages; and finally, columns D, G, J and M, the deficit in facilities reflected as numbers.

Scenario 1

Under Scenario 1, columns B, C and D show the gap between the ideal numbers of EmOC facilities in Mexico under the UN standard (1,195) and those available under the *Agreement* (466). As can be observed, 749 additional facilities were required in 2013, assuming that the population was evenly distributed throughout Mexico. In terms of state-level coverage, the overall deficit stood at 783 facilities. In other words, unless the *Agreement* increases the number of participating facilities by 62.6%, Mexico will continue to fall short of the international standard. Disaggregated by state, only two (6%) of the 32 Mexican states: Baja California Sur and Chihuahua, were in compliance with UN specifications.

Scenario 2

Under Scenario 2, columns E, F and G present the 1,085 facilities offering EmOC services in Mexico in 2013, both within and outside the network of *Agreement* facilities. All of them were administered by the MoH, *IMSS*, *IMSS-P* and *ISSSTE*. As can be observed, the deficit in the numbers of EmOC facilities totaled 110 at the national and 312 at the state level; calculations were based on the distribution of the population by state.

Scenario 3

Under Scenario 3, columns H, I and J show the totality of public facilities with EmOC response capacity in Mexico in 2013 (n=1,141). They were operated by the MoH, *IMSS*, *IMSS-P, ISSSTE*, *PEMEX*, *SEMAR, SEDENA* and state/municipal universities. As can be observed, facilities in ten states lacked the required infrastructure, with deficits amounting to 15-66% of the UN standard. This suggests that a significant number of additional facilities are required at both the national (n=54) and state (n=298) levels.

Scenario 4

Finally, under Scenario 4, columns K, L and M show that a total of 1,176 facilities provided EmOC services in 2013. This framework included all the certified facilities in the private sector and all the accredited and unaccredited facilities in the public sector. A deficit of 2%, or 19 facilities, was estimated, with some states exceeding and others lagging behind the UN minimum availability standard. Based on the total number of facilities available for the

Table 1: Comparison of scenarios for EmOC service availability in Mexico vs. UN recommendations

Ideal number of facilities according to un recommendation	Facilities providing EmOC services in Mexico in 2013											
	Within the *Agreement*					Within / outside the *Agreement*						
	public					public			public and private			
	Accredited		Accredited / unaccredited			Accredited / unaccredited			Public: accredit. / unaccredit. Private: certified			
	Scenario 1			Scenario 2		Scenario 3			Scenario 4			
	No. of available facilities	Deficit/ excess of facilities (%)	Gap between existing and required facilities (A-B)	No. of available facilities	Deficit/ excess of facilities (%)	Gap between existing and required facilities (A-E)	No. of available facilities	Deficit/ excess of facilities (%)	Gap between existing and required facilities (A-H)	No. of available facilities	Deficit/ excess of facilities (%)	Gap between existing and required facilities (A-K)
	A	B	C	D	E	F	G	H	I	J	K	L	M
National level	1 195	**466**	62.6	749	**1 085**	9.2	110	**1 141**	4.5	54	**1 176**	2	19
States													
Aguascalientes	15	**6**	60	9	**6**	60	9	**6**	60	9	**7**	53	8
Baja California	21	**14**	33	7	**19**	10	2	**21**	0	0	**23**	-10	-2
Baja California Sur	5	**11**	- 120	−6	**15**	−200	−10	**15**	−200	−10	**15**	-200	-10
Campeche	10	**4**	60	6	**16**	−60	−6	**18**	−80	−8	**18**	-80	-8
Chiapas	30	**24**	19	6	**51**	−73	−21	**52**	−76	−22	**52**	-76	-22
Chihuahua	5	**17**	- 240	−12	**34**	−580	−29	**35**	−600	−30	**36**	-620	-31
Coahuila	100	**17**	83	83	**36**	64	64	**38**	62	62	**38**	62	62
Colima	35	**6**	83	29	**11**	69	24	**12**	66	23	**12**	66	23
Durango	90	**29**	68	61	**52**	42	38	**54**	40	36	**65**	28	25
Guanajuato	20	**11**	45	9	**33**	−65	−13	**33**	−65	−13	**33**	-65	-13
Guerrero	60	**38**	37	22	**66**	−10	−6	**68**	−13	−8	**68**	-13	-8
Hidalgo	35	**22**	37	13	**56**	−60	−21	**59**	−69	−24	**59**	-69	-24
Jalisco	30	**14**	53	16	**32**	−7	−2	**33**	−10	−3	**33**	-10	-3
Mexico	80	**10**	88	70	**39**	51	41	**41**	49	39	**43**	46	37
Mexico City	160	**27**	83	133	**77**	52	83	**78**	51	82	**78**	51	82
Michoacan	45	**17**	62	28	**51**	−13	−6	**52**	−16	−7	**53**	-18	-8
Morelos	20	**5**	75	15	**15**	25	5	**15**	25	5	**17**	15	3
Nayarit	10	**4**	60	6	**19**	−90	−9	**19**	−90	−9	**19**	-90	-9
Nuevo Leon	50	**12**	76	38	**21**	58	29	**24**	52	26	**27**	46	23
Oaxaca	40	**22**	45	18	**52**	−31	−12	**55**	−39	−15	**55**	-39	-15

(*Contd...*)

Table 1: (*Continued*)

Ideal number of facilities according to un recommendation	Facilities providing EmOC services in Mexico in 2013											
	Within the *Agreement*					Within / outside the *Agreement*						
	public					public			public and private			
	Accredited			Accredited / unaccredited		Accredited / unaccredited			Public: accredit. / unaccredit. Private: certified			
	Scenario 1			Scenario 2		Scenario 3			Scenario 4			
	No. of available facilities	Deficit/ excess of facilities (%)	Gap between existing and required facilities (A-B)	No. of available facilities	Deficit/ excess of facilities (%)	Gap between existing and required facilities (A-E)	No. of available facilities	Deficit/ excess of facilities (%)	Gap between existing and required facilities (A-H)	No. of available facilities	Deficit/ excess of facilities (%)	Gap between existing and required facilities (A-K)
	A	B	C	D	E	F	G	H	I	J	K	L	M
Puebla	60	**17**	72	43	**63**	−5	−3	**66**	−10	−6	**68**	-13	-8
Queretaro	20	**7**	66	13	**7**	66	13	**7**	66	13	**9**	56	11
Quintana Roo	15	**7**	53	8	**18**	−20	−3	**20**	−33	−5	**22**	-47	-7
San Luis Potosi	25	**12**	52	13	**29**	−16	−4	**31**	−24	−6	**33**	-32	-8
Sinaloa	30	**11**	63	19	**36**	−21	−6	**38**	−28	−8	**38**	-28	-8
Sonora	30	**13**	57	17	**32**	−7	−2	**33**	−10	−3	**36**	-20	-6
Tabasco	25	**9**	64	16	**25**	0	0	**28**	−12	−3	**28**	-12	-3
Tamaulipas	35	**18**	49	17	**38**	−9	−3	**42**	−20	−7	**42**	-20	-7
Tlaxcala	15	**7**	53	8	**15**	0	0	**15**	0	0	**15**	0	0
Veracruz	80	**40**	50	40	**82**	−3	−2	**93**	−16	−13	**93**	-16	-13
Yucatán	20	**4**	80	16	**16**	20	4	**17**	15	3	**18**	10	2
Zacatecas	15	**11**	27	4	**23**	−53	−8	**23**	−53	−8	**23**	-53	-8
Overall deficit (state level)	**NA**	**NA**	**NA**	**783**	**NA**	**NA**	**312**	**NA**	**NA**	**298**	**NA**	**NA**	**296**

Soucr: Ramírez et al., based on data from the General Directorate of Health Information (2013) and the National Institute of Statistics, Geography and Informatics (2015).

Table 2: EmOC interventions performed in Mexico at facilities within and outside the agreement network: comparison by intervention package

	EmOC interventions, 2013		
	OE causes covered by the *Agreement*		All possible OE causes
	Agreement facilities	All facilities at national level	All facilities at national level
	569	549 346	734 438
Percentage of EmOC interventions performed at *Agreement* facilities vis-à-vis total EmOC interventions at national level		0.1 %	0.07 %

Source: Ramírez *et al.*, based on data from the General Directorate of Health Information (2013) and the National Institute of Statistics, Geography and Informatics (2015).

provision of EmOC services in the national health care system, Mexico presented 75% availability of facilities vis-à-vis the UN recommendation.

Table 2 shows the number of EmOC interventions performed in 2013. Of the 569 attributed to facilities in the *Agreement* network, 30% concerned normal births assisted during the expulsion stage (classified as one of the OE causes under the *Agreement*). Based on the total number of hospital discharges and the list of *Agreement* OE causes, EmOC interventions reached 549,346. However, when analyzed according to all possible OE causes, as specified under the International Classification of Diseases, Tenth Revision (ICD-10), the figure increased by 185,092 (33%), raising the total number of EmOC interventions performed to 734,438. Of note is the fact that over 99% of all EmOC interventions in the country were delivered at facilities not accredited for that purpose, while the 466 accredited facilities, all within the *Agreement* network, performed only 0.07% of EmOC interventions.

4. Discussion

The General Agreement on Inter-Institutional Collaboration for Emergency Obstetric Health Care (referred to as the *Agreement* in this article) was conceived as a strategy for reducing maternal morbidity and mortality in Mexico. Since its inception, it has spearheaded the functional integration of the national health care system.[15] This notwithstanding, however, our results demonstrate that its impact on emergency obstetric care (EmOC) has been insignificant.

As many as 750,000 obstetric emergencies (OEs) occur annually in Mexico. For every 10 pregnant women, 3.44 experience an OE during pregnancy, childbirth or the postpartum period, whether or not they have complied with adequate antenatal control measures or are subject to predisposing risk factors. It is important to note that EmOC services provided under the *Agreement* offer women the opportunity to be treated at facilities other than the ones they normally use under their health insurance plan. This means that they can choose any hospital in the network of *Agreement* facilities either on their own or by inter-institutional referral. However, utilization of *Agreement* facilities has been virtually null, with EmOC interventions representing less than 1% of the national total.

The Agreement can be depicted as a public policy that has failed to achieve its anticipated results, namely a substantial reduction in maternal mortality and an increase in EmOC services for mothers and their newborns. A negligible portion of the population and health care providers actually utilizes it as an instrument for enhancing access to care. This can be explained partly by the fact that potential users are unaware of its existence. Several authors[16,17] have reported that insurance affiliates who would certainly reap the benefits of *Agreement* comprehensive services are not referred to its participating facilities because they simply are unaware of this possibility. It has also been documented that even though health personnel are fully empowered to rely on *Agreement* facilities as an option for their patients, they prefer to use their own service networks.

To better understand why the *Agreement* strategy is falling so dramatically short of its goals, it is imperative to consider factors other than the relationship between inhabitants and facilities. For instance, the orographic characteristics of the sites where facilities are located may be obstructing the transfer of patients between health units. The case of Chihuahua is a vivid example: if only inhabitants and facilities are factored into the analysis, the state would appear to offer adequate OE coverage. However, this overlooks the fact that many state health facilities are located amidst a rugged mountainous terrain that hinders the transfer of patients. Failure to consider topographical factors was one of the limitations of our study.

In analyzing the availability of EmOC facilities in the United States, Lobis et al. found that, in 2005, 31% of the states lacked the minimum number of EmOC facilities recommended by the UN.[18] Similarly, in 2013, Mexico exhibited a significant gap between available and required facilities. Likewise, our results indicated that the Mexican State Health Services covered all affiliates of the *Seguro Popular* (replaced in January 2020 by the Health Institute for Wellbeing - *INSABI*), but provided practically no basic EmOC facilities for stabilizing patients while they reached a comprehensive facility. Finally, according to Lobis, the United States offered a large number of comprehensive EmOC services; however, they were concentrated in urban areas, with rural women facing limited EmOC availability. Moreover, these services were characterized by a high rate of cesarean births owing to fear of lawsuits and to a culture unsupportive of traditional vaginal births.

It is urgent that a much larger number of facilities be incorporated into the *Agreement* strategy which, launched by the government over a decade ago with the aim of meeting the EmOC demand of Mexican women, yields an exiguous 0.07% of the services required. All facilities within Mexican health care institutions virtually assist all obstetric emergencies without, however, forming part of the EmOC-accredited Agreement network. The purpose of this national, intersectoral pact was to ensure the quality and availability of services needed to meet Mexican public health requirements and to implement the recommendations of the UN Organization 24 hours a day, seven days a week. Being the first strategy charged with providing universal access to EmOC services, it must allow for public and private participation. According to our results, defragmentation –or integration– of the Mexican health care system requires the affiliation of all facilities in the country with EmOC response capacity, including private hospitals. This entails an exhaustive accreditation process, in itself a vehicle for improving the quality of health services. Among other functions, accreditation involves the supervision and regulation of health facilities with a view to ensuring the provision of sufficient and quality health resources (human, material and infrastructural) in the areas dedicated to obstetrical and neonatal care. In like manner, the certification of private facilities ensures their compliance with MoH norms.

EmOC accreditation (exclusive to *Agreement* facilities) and hospital certification constitute different processes despite their similarities regarding care, infrastructure, input and equipment standards in the delivery of EmOC services. They should therefore be aligned with the view of incorporating additional EmOC facilities that meet the standards of the *Agreement*.

The incorporation of private-sector services was proposed as a strategy by Mony et al. after analyzing the availability and distribution of all public and private facilities providing EmOC services in southern India. According to their results, private facilities provided 89% of comprehensive and 70% of basic EmOC services in that part of the country.[19] By contrast, our findings in Mexico show that it is the public sector that plays the leading role in the provision of population health services. Among other government efforts in this area, a law was enacted in November 2015 to the effect that EmOC services shall be provided immediately and entirely free of charge to every woman in Mexico. This initiative not only justifies, but also catalyzes, the inclusion and accreditation of institutions and

facilities currently operating independently of the *Agreement*.

Pearson and Shoo assessed the indicator *available health care facilities* in Kenya, Rwanda, South Sudan and Uganda, all suffering from very high rates of maternal mortality. According to their results, the number of facilities with basic EmOC services was far below the recommended standard, whereas the number of facilities with comprehensive EmOC services was adequate in all the participating countries except South Sudan. They found, however, that comprehensive services were concentrated in urban areas, and assisted less than 8% of all births and 2% of all obstetric complications at the national level.[20] Basic facilities are crucial for stabilizing OEs. According to the standards in the manuals for monitoring availability and utilization of obstetric services published by international organizations, achievement of the minimum internationally recommended number of basic EmOC facilities is one of the most promising steps towards abating maternal mortality. Adding such facilities protects women who either seek basic services or need to be stabilized while reaching a comprehensive EmOC facility.

Gabrysch et al. have proposed an alternative approach for measuring the minimum number of facilities required by the population. They suggest tallying births rather than inhabitants, assuring that, in so doing, the demand for EmOC facilities would rise as much as tenfold. The authors hold that current policy on skilled assistance should be revised to include all births,[21] given that all are subject to unpredictable complications that may require immediate OE support.[22] On the other hand, Campbell (2006) suggests that childbirth services should be provided at highly specialized hospitals offering comprehensive EmOC services, thus limiting the role of basic EmOC facilities.[23] In Mexico, both basic and comprehensive EmOC services are provided exclusively at secondary-care facilities, thus limiting the OE functions of primary-care facilities, most of which even lack the means for transporting referral patients to installations with the required response capacity.

Our findings indicate that the *IMSS* and State Health Services supply the majority of EmOC services in Mexico. According to the 2015 Intercensal Survey, 49.9% of the Mexican population was served by the *Seguro Popular* (administered by the State Health Services). However, our study shows that no EmOC facilities from the State Health Services and only a few from other public institutions are included in the *Agreement*. Furthermore, we found that all facilities with available EmOC infrastructure in Mexico support OEs, whether or not they are accredited for that function and operate as part of the *Agreement*. The quality of services in unaccredited facilities is unknown, however, because, as mentioned previously, quality norms are defined by the MoH accreditation and certification processes.

The Observatory of Maternal Mortality in Mexico has documented that, aside from the *Agreement,* a wide range of local initiatives have been undertaken to develop collaborative health services for OEs and other health interventions. It has also found that MoH executives themselves are unaware of exactly how many such legal instruments have been concluded. It is important to note that health service providers favor local agreements because fees are established and paid at a higher rate than under the *Agreement*. Furthermore, return on expenditure is negotiated directly between participating institutions in a shorter period (timing of reimbursements among *Agreement* participants can take as long as six months). These conditions render local arrangements more attractive to service providers.

In 2009, the UNICEF published *The State of the World's Children* report with a focus on maternal and neonatal health. A call to action among all member states, this document provides guidelines for supervising programs and formulating policies aimed at improving the distribution of EmOC facilities and other relevant health indicators in this area.[24] The report reiterates the recommendations of experts from the Mailman School of Public Health at Columbia University (1991 and 1992), subsequently appropriated by international organizations as the *Guidelines for*

monitoring availability and use of obstetric services. Since the release of their last version in 2009, these Guidelines have provided a valuable tool for analyzing and supervising EmOC services at the national level.[25]

5. Conclusion and Implications for Translation

This study indicates that the Mexican health care system is far from providing universal access to adequate EmOC services, primarily because accreditation has been limited to a few facilities notwithstanding the capacity of many others to respond to OEs. The *Agreement* strategy simply echoes the fragmentation of the health system by excluding primary-care, highly specialized and private-sector facilities from its network. Primary- and tertiary-care facilities must participate in the provision of basic and comprehensive EmOC services, respectively, if Mexico is to reach the UN international standard. This would ensure the required amount and quality of care, inputs, infrastructure and resources to meet the needs of women in Mexico. Moreover, service continuity depends on primary- and tertiary-care providers bringing EmOC services more closely into line with the needs of mothers and their newborns through coherent and interlinked interventions. It is imperative to formally institute a service model capable of ensuring comprehensive EmOC services through continuous networking among all institutional and care levels.

The *Agreement* would undoubtedly reach its potential as a catalyst for universal EmOC access were its field of action not confined to such a small number of facilities covering only the 0.07% of women with obstetric complications who are referred to its facilities by health service providers. The insufficient accreditation of facilities with EmOC response capacity and the high demand for OE services highlight the urgency of opening the accreditation process to all facilities routinely delivering such services in the national health care system. This would ensure the required amount and quality of resources to meet the needs of women in Mexico. The limited participation of facilities and institutions in the *Agreement* network hampers the achievement of full institutional coverage and impedes the reinforcement of infrastructure already available for the supply of EmOC services.

Recommendations

1) Grant universal access to childbirth and OE services at all institutions equipped with the required resources, regardless of the insurance affiliation status of women.
2) Ensure EmOC continuity across the different health care levels with the view of achieving an adequate and timely provision of services to women and newborns.
3) Open the accreditation process to all facilities providing EmOC services, whether or not they are part of the *Agreement* network.
4) Disseminate information on the *Agreement* as a universal EmOC strategy among health service users and providers.

Key Messages

- The General Agreement on Inter-Institutional Collaboration for Emergency Obstetric Health Care (the *Agreement*) renders universal access to obstetric emergency services to women in Mexico.
- The *Agreement* includes only facilities classified as accredited for emergency obstetric care, which are those that offer physical, medical and infrastructure resources for this purpose 24 hours a day, 365 days a year. However, these facilities serve only 0.07% of the national demand.
- While the other facilities in Mexico cover 99.9% of the national demand for obstetric emergency care, they are not classified as accredited for those services.
- Mexico does not offer the minimum number of facilities recommended by the United Nations for emergency obstetric care. If all public and private establishments currently offering these services were accredited, Mexico would offer 75% of required facilities.

Compliance with Ethical Standards

Conflicts of Interest: *The authors declare that they have no competing interests.* ***Financial Disclosure:*** *None of the authors has received a financial benefit in relation to this project.* ***Funding/Support:*** *The Observatory of Maternal Mortality carried out this project with funds from the McArthur Foundation.* ***Ethics Approval:*** *The protocol for this study was approved by the Research Ethics Committee of the National Institute of Public Health in Mexico as part of the doctoral thesis of the principal author. The co-authors served on the Thesis Committee.* ***Acknowledgments.*** *The authors are grateful to the McArthur Foundation and the Observatory of Maternal Mortality in Mexico for making this work possible. They also wish to thank Ana Block for editing and Patricia Solís for translating this manuscript.* ***Disclaimer:*** *None.*

References

1. Secretaría de Salud. Norma Oficial Mexicana NOM-007-SSA2-2016, Para la atención de la mujer durante el embarazo, parto y puerperio, y de la persona recién nacida. Diario Oficial de la Federación. April 7, 2016.
2. Freyertmuth G., et al. *Numeralia 2014. Mortalidad Materna en México. 1ª. Edición, Observatorio de Mortalidad Materna en México*, Ciudad de México, México; 2016.
3. United Nations Children's Fund, World Health Organization, United Nations Population Fund. *Guidelines for Monitoring the Availability and Use of Obstetric Services*. 2nd ed. UNICEF; 1997.
4 Averting Maternal Death and Disability, Fondo de Población de las Naciones Unidas. *Para comprender las causas de las defunciones maternas. Módulo. Sistema de Aprendizaje a Distancia sobre Cuestiones de Población; United Nations Children´s Fund. New York, NY, USA; 2002.*
5. Secretaría de Salud, Dirección General de Planeación y Desarrollo en Salud. Anexo 1 del Convenio General de Colaboración Interinstitucional para la Atención de Emergencias Obstétricas. Secretaría de Salud, Ciudad de México, México, 2009. http://www.omm.org.mx/images/stories/Documentos%20grandes/ANEXO%201%20APROBADO%20EL%2021.01.13.pdf Accessed January 29, 2017.
6. Observatorio de Mortalidad Materna en México. Monitoreo al Convenio General de Colaboración Interinstitucional para la Atención de la Emergencia Obstétrica, 2011. Observatorio de Mortalidad Materna, Ciudad de México, México; 2012. http://omm.org.mx/images/stories/Documentos%20grandes/b-S%C3%ADntesis%20general%20AEO%20FINAL%20PARA%20P%C3%81GINA.pdf. Accessed January 29, 2017.
7. Observatorio de Mortalidad Materna en México. Atención de emergencias obstétricas a través del Convenio General de Colaboración Interinstitucional. Entrevistas a usuarias beneficiadas. Observatorio de Mortalidad Materna, Ciudad de México, México; 2012. http://www.omm.org.mx/images/stories/Documentos%20grandes/Usuarias%20AEO%20FINAL%20septiembre%2010%202012.pdf. Accessed April 8, 2020.
8. Observatorio de Mortalidad Materna en México. Monitoreos al Convenio General de Colaboración Interinstitucional Interinstitucional para la Atención de las Emergencias Obstétricas, 2012-2013. Observatorio de Mortalidad Materna, Ciudad de México, México; 2014. http://omm.org.mx/images/stories/Documentos%20grandes/Sintesis_general_CONVENIO%20FINAL_mayo_23_2014.pdf. Accessed April 8, 2020.
9. United Nations Fund for Population Activities. *Maternal Mortality Update 2002: A Focus on Emergency Obstetric Care*. New York: UNFA; 2003. https://www.unfpa.org/sites/default/files/pub-pdf/mmupdate-2002_eng.pdf. Accessed April 8, 2020.
10. Reproductive Health Response in Conflict Consortium. Emergency obstetric care: critical need among populations affected by conflict. file:///C:/Users/14193/Downloads/BC6A813B05F7F888C1256FF00043431 4-RHRC_mar_2004.pdf. Published March 2004. Accessed April 8, 2020.
11. Secretaría de Salud. NOM 178-SSA1-1998, Que establece los requisitos mínimos de infraestructura y equipamiento de establecimientos para la atención médica de pacientes ambulatorios. Diario Oficial de la Federación, Ciudad de México, México; 1998.
12. Secretaría de Salud. NOM-206-SSA1-2002, Regulación de los servicios de salud. Que establece los criterios de funcionamiento y atención en los servicios de urgencias de los establecimientos de atención médica. Diario Oficial de la Federación,

Ciudad de México, México; 2002.

13. World Health Organization, United Nations Population Fund, United Nations Children's Fund, Averting Maternal Deaths and Disability. Monitoring emergency obstetric care: a handbook. WHO; 2009. https://www.who.int/reproductivehealth/publications/monitoring/9789241547734/en/. Accessed April 8, 2020.
14. Consejo de Salubridad General. Sistema Nacional de Certificación de establecimientos de atención médica. Establecimientos de atención hospitalaria con certificado vigente por entidad federativa, municipio, prestador de servicios y vencimiento de certificación, actualización 2013.
15 Secretaría de Salud. *El Convenio General de Colaboración Interinstitucional para la Atención de la Emergencia Obstétrica, un camino hacia la universalización de los servicios de salud*. 1ª. Edición, Ciudad de México, México, 2012. http://www.ccinshae.salud.gob.mx/descargas/Atencion_de_la_Emergencia_Obstetrica.pdf. Accessed April 26, 2017.
16. Fondren LJ, Ricketts TC. The North Carolina obstetrics access and professional liability study: a rural-urban analysis. *J Rural Health*. 1993;9(2):129-137. doi: 10.1111/j.1748-0361.1993.tb00504.x
17. Bushy A. Health issues of women in rural environments: an overview. *J Am Med Womens Assoc*. 1998;53(2):53-56.
18. Lobis S, Fry D, Paxton A. Program note: applying the UN process indicators for emergency obstetric care to the United States. *Int J Gynecol Obstet*. 2005;88(2):203-207. doi: 10.1016/j.ijgo.2004.11.025
19. Mony PK, Krishnamurthy J, Thomas A, et al. Availability and distribution of emergency obstetric care services in Karnataka State, South India: access and equity considerations. *PLoS One*. 2013;8(5):e64126. doi: 10.1371/journal.pone.0064126
20. Pearson L, Shoo R. Availability and use of emergency obstetric services in Kenya, Rwanda, Southern Sudan and Uganda. *Int J Gynecol Obstet*. 2005;88(2):208-215. doi: 10.1016/j.ijgo.2004.09.027.
21. Gabrysch S, Zanger P, Campbell OMR. Emergency obstetric care availability: a critical assessment of the current indicator. *Trop Med Int Health*. 2012;17(1):2-8. doi: 10.1111/j.1365-3156.2011.02851.x
22. Stanton C. Steps towards achieving skilled attendance at birth. *Bull World Health Organ*. 2008;86(4):242-242A. doi: 10.2471/blt.08.052928
23. Campbell OM, Graham WJ; Lancet Maternal Survival Series Steering Group. Strategies for reducing maternal mortality: getting on with what works. *Lancet*. 2006;368(9 543):1 284-1 299. doi: 10.1016/S0140-6736(06)69381-1
24. United Nations Children's Fund. *The State of the World's Children 2009: Maternal and Newborn Health*. New York; UNICEF; 2008. https://www.unicef.org/media/84866/file/SOWC-2009.pdf. Accessed April 8, 2020.
25. Banke-Thomas A, Wright K, Sonoiki O, et al. Assessing emergency obstetric care provisions in low- and middle-income countries: a systematic review of the application of global guidelines. *Glob Health Action*. 2016;9:31880. doi: 10.3402/gha.v9.31880