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## SYMPOSIUM: IVF - GLOBAL HISTORIES

# From esterilología to reproductive biology: The story of the Mexican assisted reproduction business

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**Abstract** This paper provides the first overview of how assisted reproduction emerged and developed in Mexico. In doing so it addresses two broad points: when and how treatments using assisted reproductive technology became common practice within reproductive medicine; and how the Mexican assisted reproduction industry emerged. The paper begins in 1949, when the first medical association dedicated to *esterilología* – the biomedical area focused on the study of infertility – was established, thus providing the epistemic and professional ground upon which assisted reproductive technology would later thrive. The paper then traces the way in which this biomedical industry developed, from individual doctors in their practices to networks of clinics and from a clinical practice to a reproductive industry. It also describes the different ways in which the professional community and the government have worked towards developing a regulatory frame for the practice of assisted reproduction. The paper is informed by ethnographic work conducted at clinics, conferences, online forums and websites, as well as by analysis of the contemporary national media, government documents and national medical journals from the early mid-twentieth century to the those published today.

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## Introduction

Mexico has a fairly well-established reproductive healthcare industry, with assisted reproductive technology as the main product. There are over 50 clinics operating in various

cities across the country, offering a wide range of assisted reproductive technology treatments and with a prominent profile in the national media. There is an active professional association, established in the late 1940s, with approximately 450 members and its own specialised journal. According to the

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Latin American Registry of Assisted Reproduction (RedLara), in 2013 Mexico conducted 7204 cycles to prepare women for either IVF or for intracytoplasmic sperm injection (ICSI) making it the country with the third-highest number of reported cycles within the registry (Zegers-Hochschild et al., 2016). This ranking should be considered with some caution however, because it was derived from data offered voluntarily by only 29 clinics, about half of those that exist in the country. When and how did assisted reproduction become common practice within the area of reproductive medicine? How did the Mexican assisted reproduction industry emerge and become this active? This paper explores these questions from the service providers' perspective (the perspective of the user is equally important, although it will not be discussed here). Two aspects are highlighted that are suggested were important for the establishment of the Mexican assisted reproduction industry and for its subsequent development. The first one has to do with an epistemic shift that made these technologies acceptable to the practicing medical community. The second refers to the way in which the assisted reproduction biomedical community choreographed (Thompson, 2005) the practical, technological and economic elements that are implicated in the provision of assisted reproduction services and thus established the assisted reproduction industry.

The account of Mexico's 'repro-natal history' (Franklin and Inhorn, 2016) offered in this paper is informed by the ethnographic work carried out at public and private clinics, medical and non-medical conferences, professional meetings and at online forums and websites, as well as from interviews with users and psychologists, the analysis of national journals, newspapers, magazines and legal documents. This account begins in the late 1940s and continues until the early 2000s, a period strongly marked by a shifting reproductive agenda, the growth of biomedicine, the strengthening of globalisation and neoliberal practices, and a constant yet unsuccessful struggle for democracy.

The structure of the paper traces how the practice of biomedically assisted reproduction evolved locally. Part 1 describes the epistemic shift that allowed the biomedical community concerned with infertility to make sense of and accept the new technologies of assisted reproduction that were being pioneered overseas. Part 2 looks at the emergence and establishment of the biomedical assisted reproduction industry. Due to the complexity of the Mexican healthcare systems the important points of each system are summarized in Table 1 for clarity. Likewise, in Table 2, an overview of the history of assisted reproduction in Mexico is provided, highlighting the major events that are discussed in this paper.

### The epistemic shift: from *esterilología* to reproductive biology

This account begins in the late 1940s, looking at the professional activities of a small group of physicians concerned with and dedicated to understanding and curing what they called 'conjugal sterility' (*esterilidad conyugal*). Interestingly, this group strongly opposed artificial insemination (AI), a technique that had proven successful in certain cases. This group of specialists witnessed and participated in the fundamental transformation of Mexico's reproductive agenda, a transformation that, as will be described, was

important for the development of assisted reproduction in Mexico.

### *Esterilología*: the study of conjugal sterility

According to census figures from 1910 and 1921, respectively, when the 10-year Mexican Revolution ended in 1920, the population had decreased from 15.1 million to 14.8 million (Alba-Hernandez, 1976; Mendoza García and Tapia Colocía, 2010). This situation led the state to issue two sets of laws that would help increase the population, one in 1936 and the second in 1947, which favoured reproduction by limiting the availability of contraception and by promoting healthcare practices to tackle perinatal and infectious diseases. They also stimulated immigration and the repatriation of those who left during the revolution. The effects of these policies were as expected: a decrease in mortality and an increase in the total population. By 1950, Mexico's population totalled 25.8 million; nonetheless, Mexico's official agenda continued to be pro-natalist (Mier y Terán, 1991).

It was in this context in 1949 that an all-male group of 31 physicians established the first national biomedical professional association focused on infertility, as well as one of the very first journals on this topic. They named the association The Mexican Association for the Study of Sterility (Asociación Mexicana para el Estudio de la Esterilidad, henceforth AMEE) and their quarterly journal *Sterility Studies* (Estudios en Esterilidad, henceforth EE). Among other things, they were concerned with the effects 'conjugal sterility' had on the individual, the couple and the nation. At the individual level, clinicians recognized that childlessness affected both women's and men's identity and drive in life; for a couple it meant the nullification of one of the primary purposes of pairing; and for society as a whole it represented a loss of valuable human resources that could link past and present, perpetuate cultural traditions and give the nation solidity and strength (Álvarez Bravo, 1952; Sordo Noriega, 1951).

The formation of the association and the publication of its journal confirmed the emergence of *esterilología* as 'the specialty of gynaecology, and... of andrology' (Arteaga Elizondo, 1961:60) dedicated to the interdisciplinary study of 'marital infertility' or 'conjugal sterility', involving areas such as radiology, endocrinology, psychiatry, biology, psychology and chemistry (Castelazo Ayala, 1959; Castro, 1959). As an emerging specialty, *esterilología* required a corpus of basic scientific research, for which standardized diagnostic methods and criteria were needed. Most of the research reported in EE was based on the members' clinical experience from both their private practice and their work in the publicly-funded healthcare system. In these two settings they encountered a population of patients diverse in terms of income and socio-cultural background. Within this diverse population, they found an equally diverse set of causes for infertility: from poor eating and hygiene habits, alcoholism, work-related issues (mainly in men) and lack of knowledge regarding intercourse, to the negative side effects of abortions (which were illegal), delaying marriage and the use of contraception – which they saw as causes of endometriosis (Álvarez Bravo, 1952).

As mentioned above, the association spoke of 'marital infertility' or 'conjugal sterility'. These terms suggest a

**Table 1** The Mexican healthcare system.

Healthcare scheme	Institutions and hospitals offering assisted reproduction	User eligibility	Fees	Assisted reproduction services offered
Privately owned services	<p>These are privately owned medical groups all of which house assisted reproduction clinics:</p> <ul style="list-style-type: none"> <li>• Médica SurGrupo</li> <li>• ÁngelesStar Médica</li> <li>• American British Cowdray Hospital</li> <li>• Hospital Español</li> </ul> <p>This group also includes privately owned clinics that are not affiliated to a hospital.</p>	Anybody who can pay for it or has private insurance that covers it.	<p>The user pays for the service out of pocket or via their private insurance company.</p> <p>Fees are established by the doctor and/or the hospital and medication is bought from private pharmacies at market price.</p>	Low and high complexity assisted reproductive technologies.
Work-related social security system	Each scheme has its own set of hospitals throughout the country and all offer some sort of assisted reproduction services, although some only intermittently.	<p>People working in the following sectors have the right to use the social security scheme assigned to that sector:</p> <p>State workers: Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado, (ISSSTE)</p> <p>Workers in the private sector: Instituto Mexicano del Seguro Social (IMSS)</p> <p>Workers in the Petrol Industry: Petroleos Mexicanos (PEMEX)</p> <p>Members of the military: Secretaría de la Defensa Nacional (SEDENA)</p>	Varies, depending on institution.	<p>ISSSTE: offers high complexity assisted reproductive technologies since 1996. Their services were set up with the assistance of Dr Gutierrez Najar.</p> <p>IMSS: only offers low complexity assisted reproductive technologies.</p> <p>PEMEX offers low and high complexity assisted reproductive technologies. The service is outsourced to private clinics.</p>
Public social security system Secretaría de Salubridad y Asistencia (SSA)	<p>Constituted by 12 institutes for the research and care of health related issues, and 14 general and specialised hospitals, including 3 psychiatric.</p> <p>The one concerned with assisted reproduction is the National Institute of Perinatology (INPer)</p>	<p>Offered to people that are not eligible to the IMSS or ISSSTE health security system.</p> <p>There are restrictions on age, marital status, number of cycles and type of treatment.</p>	Fees are charged depending on the users' income bracket and medication is offered at a reduced price.	<p>Low and high complexity assisted reproductive technologies.</p> <p>No gamete donation, embryo freezing or surrogacy are offered.</p>

particular way of viewing infertility, thus influencing how physicians diagnosed and treated it. Physicians considered infertility to be a predominantly curable condition of the couple. They highlighted that 'the fertilizing capacity corresponds jointly to both the husband and the wife' (Guerrero, 1954:29), hence their guidelines stipulated that 'the study of the sterile couple must be directed to both' (Valdes la Vallina, 1954:15), the couple are considered as a unit. This particular view accounted for the frequent use of

post-coital tests, which in addition to enabling conformity with the religious prohibition on masturbation, complied with the association's view that infertility could be cured if the right diagnosis was reached. As stated in a 1954 article published in EE: 'conducting routinely post-coitus studies of the ejaculated in the vaginal fluids [...] allows us to assess the behaviour of the sperm in the medium it must act in, and not in a crystal box [...] we need to study, in the mix of male-female secretions, the morphology, quantity, motility

**Table 2** Overview of the history of assisted reproduction in Mexico.

Time frame	Association	Assisted reproduction context	Legal and political context
1940–1966	Asociación Mexicana de Estudios en Esterilidad – AMEE <i>Mexican Association for the Study of Sterility</i>	Infertility was considered a medical problem concerning both women and men, with negative effects for the individual, the couple and the nation. It was called conjugal infertility or marital sterility. <i>Esterilología</i> was the multidisciplinary medical speciality dedicated to studying and treating conjugal infertility. Since artificial insemination was not viewed as a curing procedure, it was considered unacceptable. 1950–1970 The first journal dedicated to the study of infertility was published: <i>Estudios en Esterilidad</i> 1961 The first AMEE annual conference was held (the 53rd conference was held in 2016)	Population growth was desired, hence there were two sets of laws that strictly regulated and restricted contraception methods. The first was published in 1936 and the second in 1947.
1966–1992	Asociación Mexicana para el Estudio de la Fertilidad y Reproducción Humana – AMEFH <i>Mexican Association for the Study of Fertility and Human Reproduction</i>	Reproductive biology is included in the general curricula of the medical degree and as a topic of inquiry in the research centres focused on reproductive biology. Reproduction was being studied and controlled through hormonal and surgical methods. Between 1985 and 1986 the first private assisted reproduction clinics were established, one in Mexico City and the other in Monterrey, Nuevo León. 1988 Mexico's first assisted reproduction success stories: Carlos Esteban, conceived via GIFT, was born on 24 of February and Andrea, conceived via IVF, was born on the 23 March	Population growth was starting to be framed as a problem, hence biomedical and political attention was shifted towards controlling fertility. In 1974 laws were passed to promote family planning strategies (Ley General de Población), a government body was created to overlook the family planning campaigns (CONAPO) and the media was used to promote these campaigns (using Mexican soap operas known as <i>telenovelas</i> ).
1992–to date	Asociación Mexicana de Medicina Reproductiva – AMMR <i>Mexican Association of Reproductive Medicine</i>	From 1993 on, new private assisted reproduction clinics began to open in Mexico City and other major cities across the country. In 2008 the first issue of the association's new journal, <i>Reproducción</i> , was published.	In 1999 the first proposal to legislate assisted reproduction was presented by the Green Party. Since then, over twenty proposals have been presented. In 2000 CENATRA was created. In 2001 COFEPRIS was created.

CENTARA = National Transplant Centre; COFEPRIS = The Federal Commission for the Protection of Sanitary Risk; CONAPO = National Population Council; GIFT = gamete intrafallopian transfer.

and vitality modifications of the male cell in question.' (Valdes la Vallina, 1954:18).

Considering (in)fertility as a conjugal matter meant that single women were not eligible for the diagnosis of infertility, let alone its treatment. While they viewed maternity as a deeply rooted natural female instinct, practitioners of *esterilología* could not even consider that single women could desire children since this desire resulted necessarily from marriage and if she had relinquished marriage, how could she bear the responsibilities of being a mother? (Arteaga Elizondo, 1961).

Their understanding of 'marital infertility' also influenced how they viewed AI. Members of AMEE considered that using AI in humans was morally problematic. First, they acknowledged that the Catholic Church disapproved of it

(Pope Pio XIII, 1956). Second, they considered that using donor sperm could imply adultery and create uncertain paternity. Third, they believed that practicing AI was 'professionally immoral' (Arteaga Elizondo, 1961), arguing that physicians were meant to cure infertility, not simply bypass it. In the words of an AMEE member: 'the solution to the problem is not to practice artificial insemination, but to fix the problem that is preventing normal insemination [...] adopting [AI] is to manifest the uselessness of our resources and treatments within the field of male infertility'. (Guerrero, 1953).

While the AMEE and the government were focused on curing infertility and promoting reproduction respectively, academics and politicians in the USA and Europe were becoming concerned with the 'demographic explosion' in

Asia and Latin America and began to pressure these countries to introduce family planning programmes and policies that would halt population growth (de Barbieri, 2000; Caldwell, 2001; Najam, 1996; Soto-Laveaga, 2007). This fear motivated investments in biological and socio-anthropological research projects focused on human reproduction to be carried out in these countries, with the purpose of improving contraception methods and developing successful family planning programmes. However, ideas around controlling reproduction were not entirely novel to the population. Even when Mexico's official agenda was still pro-natalist and the sale of contraceptives in public health centres was still illegal, some people were already using various contraceptive methods such as rhythm, withdrawal, intrauterine device and surgical sterilisation (CONAPO, 1999; Zavala de Cosío, 1992). Likewise, during this time a team of Mexican scientists led by Luis Ernesto Miramontes Cárdenas, Carl Djerassi and Jorge Rosenkranz were synthesising one of the main molecules necessary for the development of the contraceptive pill by the Mexican pharmaceutical company Syntex (Arredondo-Rivera and Juárez-Sánchez, 2009).

It was within this context that the concern from overseas regarding Mexico's demographic explosion reached the AMEE. In 1953, Dr Abraham Stone, a physician from New York, published the first article in the journal *EE* to talk about the urgent need to balance population size with natural resources, between (industrial) production and (human) reproduction (Stone, 1953). However, it took 10 years for the association to revisit this topic, possibly due to several factors. First, because some were not sure overpopulation was a problem in Mexico; second, because they feared antagonising religious sensibilities; and third, because they did not see a contradiction between what they did and the family planning suggestions for which foreign countries pressured (Fournier Mateos, 1964). By the mid-sixties public discussion of this 'demographic explosion' was already so loud and politically so important, both internationally and nationally, that AMEE began to listen. Hence, as part of their annual meeting in 1964, the AMEE convened a special multidisciplinary symposium to address Mexico's demographic situation. They wanted to obtain first-hand information that would help them determine if Mexico actually had a demographic problem and, if so, to what degree. Parallel to this, reproductive biology became recognized as a biomedical speciality as suggested by the following events: first, the creation of an independent department dedicated to this area of research and the establishment of a fertility service in two of the most important hospitals, one in the Instituto Nacional de Nutrición Salvador Zubiran (INNSZ) (National Institute of Nutrition Salvador Zubiran), which had 20 years of experience researching hormones and reproduction, and the other in the Instituto Mexicano del Seguro Social-Centro Médico Nacional (IMSS-CMN) (Mexican Institute of Social Security) (Gual-Castro, 2000); second, with the establishment of the academic field of reproductive biology in the Faculty of Medicine at the Universidad Autónoma Nacional de México (UNAM) (National Autonomous University of Mexico), initially as a specialisation programme and then as masters or doctoral degree (Gual-Castro, 2000).

Although AMEE members had originally been somewhat sceptical of the 'demographic explosion' discourse and the

proposal to impose family planning as a solution, the political, professional and academic changes that took place during the 1960s described above contributed to the prevailing of this discourse, leading to a significant shift in the professional culture of Mexican *esterilología*. This shift can be appreciated through both the content of the journal and the ethos of the association. From 1965 to 1970, when the last issue of *EE* was published, there was a steady increase in the number of articles concerned with contraception. Likewise, AMEE's 1967–1969 administrative board featured doctors who were already offering oral contraceptives to their patients and during their fifth annual meeting held in 1968 there were more speakers addressing contraception than ever before. However, the most important event that reflects this shift takes place in 1966 when, under the leadership of Dr López de Nava, the association decided to change its name to Mexican Association for the Study of Fertility and Human Reproduction (Asociación Mexicana para el Estudio de la Fertilidad y Reproducción Humana, henceforth AMEFRH). During his acceptance speech as newly elected president in 1967, Dr Francisco Durazo Quiroz argued that the new name reflected more accurately the association's activities and interests, which had moved from focusing on sterility and reproduction (the *esterilología* perspective) to focusing on fertility and contraception (Durazo Quiroz, 1967).

### From *esterilología* to sterilisation

After the United Nation's World Population Conference held in Bucharest in 1974, three important political moves were made to reinforce the new perspective on population growth. First, the General Population Law was enacted (Ley General de Población), obliging the state to offer family planning services for free (Gutmann, 2009; Pick de Weiss, 1987; Vallarta-Vázquez, 2005). Clinics and physicians were given targets for female sterilization or incorporation into the family planning programme. As a result, Mexican women accessing the public healthcare system began to be offered contraception systematically at every medical consultation they attended (a practice commonly referred to as the '*oferta sistemática*' policy). Second, the 4<sup>o</sup> article of the Constitution was amended to state that every person has the constitutional right to decide the number and spacing of children they have (CONAPO, 1999). Third, the National Population Council (Consejo Nacional de Población, CONAPO) was created and made responsible for transforming people's attitudes towards family planning methods in order to achieve the new ideal family composition: mother, father and two children (Soto-Laveaga, 2007).

This growing acceptance of and interest in controlling reproduction biomedically led the administrations of the various social security systems (see Table 1) to establish research centres and family planning clinics. In parallel, reproductive biology became a specialisation programme within the Faculty of Medicine at the National Autonomous University of Mexico (UNAM) (Gual-Castro, 2000). The research and training being done via these research centres and specialisation programmes were mostly focused on controlling fertility through endocrinological and surgical procedures. Knowing how to manage contraception through hormonal control and surgical procedures turned out to be

important skills for assisted reproduction to develop, as one of the assisted reproduction pioneers told me during an interview:

contraception and infertility are both related to hormones, they are the two sides of the same coin [...] we did lots of research in endocrinology, hormones and reproduction [...] we created a contraceptive program [...] It was there that I started treating patients with infertility problems. Back then it was only artificial insemination (Interview with Dr GN, field notes 2007).

This emerging view of reproductive health encompassed fertility and infertility, conception and contraception – drawing links between them as two different ways of controlling reproduction via hormonal management and surgical interventions.

### The dawn of assisted reproduction: the establishment of reproductive biology

Between the late 1950s and 1970s, a number of Mexican physicians completed internships in the USA with leading reproductive endocrinologists such as Robert Greenblatt, who developed protocols for ovarian stimulation using clomiphene citrate (Zárate and Saucedo, 2007). When these physicians returned to Mexico, they created programmes and laboratories dedicated to issues concerning reproductive endocrinology and they established working collaborations with these overseas experts (for example, Dr Efraín Vázquez Benitez from the Hospital Español). These collaborations resulted in invitations for them to come to Mexico:

in order to start the reproductive unit at the Institute, the [...] director invited specialists to train his team, [they invited] Dr José Balmaceda and Dr Ricardo Asch, the creators of GIFT [...] (Interview with Dr PDC, field notes, 2008).

At that time, Dr Asch had also been working with Dr Greenblatt. Years later he developed centra (GIFT) with Dr Jose Balmaceda, a technique that seemed quite promising back in the late 1980s (Yovich, 1994) and, for some people, it implicated fewer moral uncertainties since fecundation occurs inside the woman's body – as opposed to the situation in IVF. Both Dr Asch and Dr Balmaceda participated in the process of importing and translating assisted reproductive technology into Mexico by making it accessible to local gynaecologists and biologists. Since they were Latin American, Argentinian and Chilean respectively, they could communicate with the Mexican teams easily and they were aware of the cultural elements shaping the local patient-physician relationship. One of their major contributions was to introduce GIFT.

Another physician who visited Dr Greenblatt at the University of Georgia was Dr Samuel Hernández Ayup and while there he also met Dr Asch. When he returned to Mexico he established, together with Dr Santos Haliscak and Dr Pedro Galache, what is now the Institute for the Study of Human Conception (Instituto para el Estudio de la Concepción Humana, IECH—formerly the Instituto para el Estudio de la Reproducción Humana, INPERH) in the wealthy conservative northern city of Monterrey. It was they who in 1987 claimed

'the first' successful pregnancy using assisted reproductive technology (specifically GIFT): Carlos Esteban, born on 24 of February 1988 (Díaz Spindola et al., 2011). This first success was reported in a paper published in the journal of the Academy of Gynaecologists and Obstetricians (Hernández Ayup et al., 1989) which describes a cohort of 72 patients who underwent GIFT, 19 of whom became pregnant (three with multiple pregnancies). By the time the paper was published, 11 babies had been born. In this paper the authors give extensive credit to Dr Asch as the creator of GIFT and as a direct influence in the positive outcome of the cases reported in the paper: 'We thank the medical and technical aid given by doctors Ricardo Asch, José Balmaceda, Francisco Rojas...' and five more people, one of whom was a chemist (Hernández Ayup et al., 1989). Interestingly, in the paper they never claim to be the first in Mexico to accomplish such a task, however in that same issue, they do say they are reporting the first national success using ova donation (Santos Haliscak et al., 1989). IECH is still one of the leading clinics in the country; it has facilitated the conception of over 1700 babies and the training of 37 specialists (IECH website).

A month after Carlos Esteban's birth, another 'first' accrued. This time it was the birth of Andrea, the first Mexican baby conceived using IVF (Cuneo-Pareto and Gaviño-Gaviño, 2015), and born on 23 March in Mexico City. In this case, the team responsible for it was headed by Dr Gutierrez Najar, a key figure in both the development of family planning programmes as well as in the establishment of assisted reproduction in Mexico (Cruz, 2003). As far as is known, this case was not reported in the academic literature. Like the doctors at the IECH in Monterrey, Dr Guterrez Najar assisted in the conception of over 3000 babies and trained many specialists who then went on to open their own clinics (AMMR, 2014). Between 1986 and 1992, the IECH and Dr Guterrez Najar's clinics were the only two private clinics operating in Mexico. In addition to these, there was an assisted reproduction service within the public healthcare systems (SSA), offered at the National Institute of Perinatology (INPer, SSA) (see Table 1). Its assisted reproduction unit was created in the mid 1980s under the direction of Dr Alberto Kably Ambe, placing INPer as the third place where assisted reproduction was pioneered in México. Because it is a teaching hospital, it has been central as a training site for many people interested in reproductive biology, and because it receives federal funding, it can offer assisted reproduction services at a lower cost, benefiting people with fewer economic resources.

In 1992, only a few years after these first successful cases of assisted reproduction, the former AMEE, later AMERFH, changed its name again, now to Mexican Association of Reproductive Medicine (Asociación Mexicana de Medicina de la Reproducción, henceforth AMMR). Each change of name reflects a shift in perspective. While the previous names focused on studying the dyad infertility-fertility, the new and current name focuses on understanding and manipulating the general process of reproduction from a biomedical perspective. As mentioned previously, the EE journal closed in 1970 and the members of AMEFRH had to migrate their publications to *Gynaecology and Obstetrics of Mexico* (Ginecología y Obstetricia de Mexico), a more general, but better-established, journal. However, by 2008 the association revived the idea of having its own specialised journal,

and thus began publishing *Reproduction* (Reproducción). While the members of the AMMR link themselves to the AMEE, they make an open effort to cut ties with the association's previous publication, EE. This effort is clearly stated in the introductory article published in the first issue of *Reproduction*: '[...] due to the extent of its focus which reflects the evolution of the association, we cannot consider this journal to be a second stage or period of the previous journal. Instead, this is a new space where [...] our national and international research fellows can publish' (Vázquez Benítez, 2008:11). The reasons stated for this distinction again suggest the change of perspective from *esterilología* to reproductive biology.

During the last six years of the twentieth century, Mexico's fertility rate decreased to 2.4 children per woman and the government shifted its attention from population control to reproductive health (CONAPO, 1999). Within this new paradigm, reproductive rights, family planning, maternal and child health, infertility and sexually transmitted infections and diseases, were all united under the same conceptual frame and established the foundations for the new Reproductive Health Programme (Programa de Salud Reproductiva). Its purpose was to offer information and orientation regarding prevention, diagnosis and handling of infertility. During this period, the number of assisted reproduction clinics multiplied almost six-fold: from 3 clinics in 1994 to 17 in 2000.

As described above, between 1970 and 2000 the question of how to tackle infertility changed both steadily and significantly among professional groups, government agencies and the general public. Low and high complexity assisted reproductive technology became less morally controversial; instead, the techniques were considered as a way of giving patients the child they desired. This change occurred concurrently with the change from the family planning paradigm to the reproductive health paradigm. Hence, the general message being sent was one that underscored that biomedical knowledge and technology were able to control reproduction – a message which, as Adele Clarke has argued, positioned reproduction increasingly as a phenomenon to be explored, managed and disciplined (Clarke, 1998).

The end of the twentieth century marked a clear turning point for assisted reproduction in Mexico. The country began the new century with at least two public healthcare services offering assisted reproductive technology, seventeen private clinics scattered throughout eight cities, a professional association dedicated to reproduction (AMMR), one proposal to legislate the existing clinics (more on this below), professionalization programmes at three universities and some media coverage of the matter. All this suggests that by the year 2000, Mexican assisted reproduction had reached a new phase (see Table 2).

## Part 2 – the assisted reproduction industry

The previous section traced the epistemic turn that resulted in *esterilología* transforming into reproductive biology (highlights summarized in Table 2). This section looks at the establishment and consolidation of the assisted reproduction industry and the way it is regulated. This part of the story begins in the last decade of the twentieth century and covers

the first decade of the twenty-first. During this period, treating infertility moved beyond the gynaecological service within hospitals and healthcare systems into the highly specialised assisted reproduction clinic. But above all, it developed into a healthcare service that resembles a commercial industry, particularly assisted reproduction clinics within the private sector.

Towards the end of the 1990s, a second wave of clinics (approximately 11 in number) started to emerge in places other than Mexico City and Monterrey thus enabling the spread of assisted reproductive technology nationwide. Many of these clinics were established by the first generation of specialists trained at the clinics and services mentioned above. It must be remembered that assisted reproductive technology is expensive, requiring significant financial investment in equipment and materials and in employing a large number of staff; hence, practitioners interested in opening their own clinic who lacked the means to do so independently, had to find ways of coping with the significant financial and logistical challenges. Some physicians opened branches of larger clinics, following what I describe as the 'network model'. Under this model there is one large well-equipped head-quarter clinic, which centralizes provision of the most expensive procedures and distributes the less technologically demanding parts of the treatments across many smaller satellite clinics. Other emerging professionals decided on an alternative 'outsourcing model'; when physicians outsource assisted reproductive technology they either rent the equipment and perform the procedures themselves or they send the gametes to equipped clinics and have them perform the procedures (Cf. González-Santos, 2011). Here we can see the emergence of the first characteristic of an assisted reproduction clinic: it is a multidisciplinary group of collaborating specialists that includes physicians, biologists, nurses and administrative staff.

As stated before, many of the clinics that opened towards the end of the twentieth century were established by doctors who had been trained at one of the first three facilities mentioned above. One exception was a clinic established in Guanajuato by doctors who had returned from training at a clinic in Valencia, Spain. The distinguishing characteristics of the way in which the Spanish clinic operated were its emphasis on becoming a multinational business, its strong use of marketing to promote services, and managerial strategies that allowed them to offer services at a lower cost. Even though physicians and biologists judged the Spanish clinic's clinical and laboratory practices to be interesting, they also considered that they needed to be adapted in order to meet local needs and requirements. For example, in terms of how patients were managed, 'Mexicans require a different bedside manner... they like being seen by the same doctor all through their procedure' (Biologist, field-notes, 2007). Interestingly, as will be described below, Mexican clinics did eventually operate in the 'Spanish' fashion, in which patients are seen by more than one doctor throughout the cycle of treatment. A few years later, as a result of market research, the Spanish clinic opened its own branch in Mexico City and established its own training programme, all this as part of their efforts to establish a multinational assisted reproduction corporation. Recently, however, they merged with a local clinic that holds branches in several cities across the country ([www.ivi-fertilidad.com/es-mx/pacientes/](http://www.ivi-fertilidad.com/es-mx/pacientes/), accessed 26 June, 2016).

As I have charted, both the USA and Spain influenced this stage of Mexican assisted reproduction, each in their own particular way. The USA influenced Mexican practice through physicians who came to Mexican clinics and through Mexican physicians going to the USA for training. Likewise, the influence of the USA was established in the alliances some Mexican clinics had with some USA clinics. The Spanish influence can be seen in the training received by some biologists and physicians, but mostly in the marketing strategies employed by the Mexican branch of the Spanish clinic and by those who trained there.

The maturing of the first generation of assisted reproduction specialists trained by the forefathers at the clinics mentioned above resulted in the spread of assisted reproduction clinics beyond the original services and out of Mexico City and Monterrey. It was the first wave of private assisted reproduction clinics opening across the city and the country, slowly adding up to over 50 registered in The Federal Commission for the Protection of Sanitary Risk (COFEPRIS) in 2015. It is worth clarifying that many of the specialists who work predominantly in the public assisted reproduction services also work at private assisted reproduction clinics (although this is not so the other way around). This means, among other things, that people who attend the public healthcare service might be seen by the same doctor as someone who attends a private clinic. This also means that the community of assisted reproduction professionals is not clearly divided between those in the public sector and those in the private sector. This 'double-shift' is quite common within the Mexican healthcare system across all specialties; a consequence, at least partially, of economic factors.

### The public assisted reproduction service and the private assisted reproduction clinic

Privately owned assisted reproduction clinics, which are potentially lucrative businesses, are not subject to the same restrictions imposed on publicly funded assisted reproduction services regarding, for example, patient eligibility, the range of protocols offered and cost. Public assisted reproduction services operate within existing government-run hospitals, which have limited infrastructure (e.g. space and staff) and funding, and thus need to negotiate the resources required to offer assisted reproductive technology within a complex bureaucracy. This might be one of the reasons for the limited range of protocols they offer (which varies between health services), for restricting their services to women under 35 who are in a heterosexual relationship, and for the limited scope they have in offering the services at a lower cost (since they are partially subsidised) (see Table 1). The limitations they impose suggest, among other things, a practical perspective, for they do not engage in gamete donation, cryopreservation or surrogacy, all practices that require extra material and bureaucratic infrastructure. Private assisted reproduction clinics, on the other hand, respond to a different, more capitalist, logic. Not only do they offer a wider range of treatments without restrictions in terms of gender or marital status, albeit at a higher cost (see Table 1), but they also employ complex managerial and marketing schemes, something previously unseen in Mexico in the area of biomedical health services.

As a first step, these schemes involve the creation of an identity for the clinic. Many private assisted reproduction clinics have a corporate-like identity. This identity, which is not based on the reputation of the doctors that run them and work in them, is constructed using a name, a logo and a slogan which usually make reference to infertility, fertility, motherhood, reproduction, genetics, gametes, pregnancy, babies, hopes or desires. This separation between the identity of the clinician and the identity of the clinic allows a degree of independence between the clinic and the physician, an independence which is also present in the way the clinics operate: 'due to the structure the new clinics are taking, patients are no longer "the doctor's patient", they are becoming "the clinic's patients"' (Head of Clinic, field notes 2008). The clinic's identity is then used as part of a marketing scheme, which includes a presence in social media (e.g. Facebook, Twitter and Pinterest), advertising in the printed press (newspapers and magazines), on television, radio, billboards and in public spaces (e.g. bus-stops). These advertisements are coordinated by the PR department and are part of a scheme that tends to rely on promissory rhetoric (Sunder Rajan, 2007); for example, during promotional events organized at conference venues with approximately 500 attendees per session, free consultations are offered as raffle prizes, discount vouchers are handed out for future treatments, payment options are presented, people are invited to share their testimonies of success and the basic elements of assisted reproductive technology are explained. It is in these last two activities above all where the clinics frame the use of assisted reproductive technology as something scientifically proven to work, both by quoting information published in scientific journals and by presenting testimonies of success. This message of almost certain success is then re-fuelled by media coverage of assisted reproductive technology, which is usually very uncritical and has mostly portrayed assisted reproductive technology as highly successful, as is illustrated in the following two examples, the first being a piece in a national newspaper and the second being information from a clinic's website:

As long as a woman has a uterus, she can achieve pregnancy, even if she is in menopause, and with the technique we offer, 80% of the couples reach pregnancy in only 40 days. (Rivera, 2008).

You will have a baby at home, or your money back.' 'We are the Latin-American clinic with the highest rate of success: 94% that you will have a baby at home (*sic* Ingenes, <http://www.ingen.es.com> consulted the 1July, 2015)

These actions (the advertisements in the media and the promotional events) have played an important role in making assisted reproductive technology visible and they have contributed to the construction, socialisation and normalisation of these techniques. Because of the way infertility is framed – in terms of causes and procedures to overcome it – and the images that are used, established gender roles, kinship bonds and the power of science are also reaffirmed. The desire for children and the causes of infertility continue to be placed predominantly on women; however, there is a move towards lessening the importance of a genetic link with the future baby (thus laying the ground

for a better acceptance of gamete donation) and finally, the great capacity of science and biomedical intervention in life processes is praised.

## Regulating the assisted reproduction industry

Currently, the Mexican assisted reproduction industry is collaterally regulated by laws and guidelines established by two federal bodies: CENATRA (National Transplant Centre) and COFEPRIS. I call this collateral regulation because the aspects of assisted reproduction overseen by CENATRA and COFEPRIS only incidentally fall into their jurisdiction; they do not have assisted reproduction-specific laws. CENATRA, established in 2000, is responsible for administering organ donation, and tissue and cell transplants through the National Transplant Registry where donors, recipients, procedures and the healthcare providers involved are recorded. Because gametes are cells, they register the donation of germinal cells (i.e. gametes). However, the infrastructure offered by CENATRA for gamete donation registry is not robust (anyone can upload data), hence the information they gather and produce lacks solidity. Similarly, COFEPRIS was created in 2001 to issue licences allowing healthcare establishments to deal with surgical and obstetric procedures and to handle organs, tissues and cells. Recently, it has taken on the task of conducting sanitary inspections of assisted reproduction clinics. To date, COFEPRIS has registered 52 assisted reproduction clinics (GIRE, 2015) and, according to one physician, in 2016 they began a comprehensive campaign to verify that assisted reproduction clinics are working to appropriate standards (field-notes, 2016).

In addition to the regulations established by COFEPRIS and CENATRA, there are some states within the federation that have active articles, mostly in their civil codes, that oversee specific aspects of assisted reproduction. These deal with issues related to establishing kinship when using assisted reproductive technology (in Aguascalientes, Colima, Morelos and Sonora), surrogacy (in Tabasco) and embryo donation (in Querétaro), as well as prohibiting the use of embryos for research or cryopreserving them (in Coahuila) (GIRE, 2015). Little attention had been given to the existence of these articles until a debate surrounding surrogacy in Tabasco emerged. The debate arose when the laws in Thailand and India, traditionally considered as 'the places to go' for those who needed surrogacy but could not access it in their own country, became more restrictive. As a consequence, Tabasco became the new 'place to go', due to its permissive laws. In response, Tabasco's laws were changed to allow only Mexican nationals to use surrogates, thwarting the reproductive tourism market that was on the brink of explosion.

However, the story of how policymakers and assisted reproduction practitioners are trying to regulate these services is more complex than this. There are at least four interconnected arenas where regulation is being negotiated: (i) presentation of proposals by various political parties; (ii) expert forums organised by the Chamber of Deputies; (iii) practical guidelines dictated by the professional community (which are not legally binding); and (iv) a standard of practice currently under elaboration (which could be legally binding). As is described in more detail below, in most of

these efforts professionals and policymakers are working in collaboration.

## Proposals for regulation

The first proposal to regulate the assisted reproduction industry was presented by the then-emerging Green Party in 1999. Since then, each political party has presented its own proposal, resulting in more than 20 by 2012, yet none has been passed into law. Why this should be so is still under research. Some physicians have speculated that it might be because a law regarding assisted reproduction has no political value, others think it might be due to certain potentially controversial aspects covered these laws (e.g. the destiny of untransferred embryos and the use of assisted reproductive technology by homosexual couples). Establishing how the various proposals came into existence (for example, who came up with the idea of writing one or how the different elements were debated and agreed upon) is also still not clear. There are, however, some elements that can help to begin to paint a picture.

The first of these elements lies within the motivations and justifications for the proposals. Most proposals start out by expressing a certain level of apprehension with the development of biotechnologies such as genetics and assisted reproductive technology. Specifically, there is concern with the use of these biotechnologies for purposes other than granting infertile couples or individuals the opportunity to procreate. This apprehension is justified because these biotechnologies are considered capable of affecting the reproductive and evolutionary process of humanity by offering the possibility to manipulate gametes and embryos with eugenic purposes. In addition to the social, ethical, juridical and biomedical implications, the use of biotechnologies have generated legal voids, both juridical and axiological, that need to be addressed. In light of this, representatives of several political parties have put forward different initiatives with the purpose of updating the existing laws, at least to a certain extent. Some proposals also mention the fact that other countries have already legislated these procedures and thus Mexico should do the same.

A second element can be found in their content. Most initiatives seek to regulate the way assisted reproduction services are offered and to control cloning and stem cell research. All initiatives agree to allowing the use of most assisted reproduction procedures (AI, GIFT, IVF, ICSI) when being used to help a 'traditional family' have children using their own gametes and the wife's uterus. The structure of this 'traditional family' can be inferred to be a stable heterosexual couple (not necessarily legally married) where the woman is aged between her early twenties and her early forties. It is when this traditional family model is altered that discrepancies between proposals appear: for example, allowing same-sex couples, single or widowed users, gamete or embryo donation, surrogacy or embryo selection (for other than medical reasons). This could suggest that what causes debate and disagreement is altering what is considered the 'acceptable' family structure. A third brush-stroke that can add to the picture is the participation of some physicians in the process of elaborating some of these

proposals (field notes, 2007). Their participation, however, did not appear in the official documents of the proposals.

### Expert forum

In 2001 the Chamber of Deputies organised an expert forum with the purpose of helping policymakers understand the medical and legal implications of assisted reproduction and thus develop appropriate regulations for assisted reproduction services (Galván Antillón, 2001). Seven different speakers were invited to talk about causes of infertility, embryo development, human genetics and the biological, technical, bioethical and legal aspects of assisted reproductive technology. Dr Gutierrez Najar, the leader of the team who achieved the first Mexican IVF-conceived baby, was among these experts. There were also two geneticists, one embryologist, one bioethicist and one lawyer, but no users, psychologists or nurses were invited. Although all speakers approved of the use of assisted reproductive technology, traditional gender roles and conservative Christian views were reproduced in these presentations. A few years later a second forum, called Assisted Reproduction in Mexico and its Expectations (Cámara de Diputados, 2004) took place in four different cities (Cuernavaca [Morelos], Monterrey [Nuevo León], Guanajuato [Guanajuato] and Mexico City). As far as is known, evidence that this forum had any effect, other than familiarising policymakers with the topic, has not been published.

### Practical guidelines

In 2012, a group of assisted reproduction professionals from 34 centres, both public and private across the country, and one member of a non-governmental organisation (NGO), were organised into seven thematic groups to establish a National Consensus document on assisted reproduction. This document was published in two national biomedical journals simultaneously: in the *Journal of the Society of Gynaecologists and Obstetricians (Ginecología y Obstetricia de México)* and in the journal published by AMMR (*Reproducción de México*). The themes covered were: patient eligibility, ovarian stimulation protocols, ova aspiration, embryo transfer, hormonal support, cryopreservation and informed consent. In the publication they stipulate, for example, that single women or women in a heterosexual or homosexual relationships (not necessarily legally married) are eligible for assisted reproduction; that when it is a couple soliciting the services, both members of the couple must give their consent for the procedures; and that the destiny of surplus sperm, ova and embryos has to be clearly stipulated in the consent form. The consensus considers the possibility of donating or transferring non-used gametes and embryos to other couples for reproductive use or using them for scientific research (Kably-Ambe et al., 2012). Although the consensus is not legally binding, it has great value because it implies a collaboration between biomedical professionals – who would more normally be competing with each other for clients – to arrive at a unified perspective on how assisted reproduction should be practiced. This is one more in a series of steps taken towards the professionalization and solidification of this biomedical specialty (cf. González-Santos, 2014).

### Standards of practice

Currently, a new strategy is emerging regarding standards of practice. Rather than generating a general comprehensive law, assisted reproduction specialists (such as heads of clinics and members of professional associations), in conjunction with representatives of government offices (e.g. Ministry of Health), members of private and public hospitals and NGO are developing standards of practice for assisted reproduction services. This document is still under construction and the outcome of it is still very much uncertain. The purpose of this document is to establish a Mexican Official Norm (NOM) or standard for assisted reproduction. Those that already exist specify obligatory technical regulations, requirements and specifications for goods and services and cover a wide range of areas, including health services and practices. If passed, this assisted reproduction NOM would establish how diagnosis and treatment are conducted, the minimal requirements for infrastructure, and for the professional profile of the staff.

It can be seen that policymakers and professionals collaborate in three of the four arenas, although the proportion and place each occupies differs. In the proposals and forums the professionals are fewer and have less power, while in the document for the standards of practice it is the professionals who lead the discussion and outnumber the non-biomedical contributors.

### Conclusion

The purpose of this paper has been to offer an overview of how assisted reproduction emerged and developed in Mexico by addressing two broad questions: (i) When and how did assisted reproductive technology become common practice within the area of reproductive medicine? and (ii) How did the Mexican assisted reproduction industry emerge? In doing so, this study has traced the development of the Mexican assisted reproduction industry from *esterilología* to reproductive biology, from a clinical practice to a reproductive industry, from individual doctors and their individual practices, to networks of clinics (see Table 2 for a summary). Throughout this narrative, certain aspects have been highlighted that I consider were prominent in this process and which are summarized below. First, this paper discussed the way in which gynaecologists, from the 1940s to the present day, have recognized and acknowledged the importance of family – and thus of child bearing – within the life of Mexicans, both as individuals and as a society. Second, it pointed out that during the twentieth century, biomedicine was concerned with and involved in the hormonal and surgical control of reproduction, either to limit the number of offspring or to help those who cannot reproduce unaided. Third, it told the story of how Mexican gynaecologists came into direct contact with those developing assisted reproduction techniques (specifically GIFT). These first three elements contributed strongly to what I call the epistemic shift (Cámara de Diputados, 2004), which made the development of assisted reproduction possible. Although I would not argue that these elements were the only ones involved in this shift, they are the ones that clearly made assisted reproductive technology both accessible and acceptable to the

biomedical community; they changed what assisted reproduction professionals considered to be their subject of concern – the legitimate questions or problems, the acceptable answers and solutions, and the valid and viable methods to deal with infertility. Within *esterilología* the question was ‘Why can’t this heterosexual couple achieve pregnancy after coitus?’. This suggests that the subject was the heterosexual couple, the accepted solution was to give the couple a genetically linked baby and the accepted method was to fix what was causing infertility in order to be able to achieve non-assisted pregnancy, leaving in place the conditions for further pregnancies to be non-assisted as well. In contrast, within the framework of reproductive biology the question is ‘How can I help this person to have a baby?’ (as indicated by the clinic’s slogans), the subject is the individual, their marital status or sexual orientation is irrelevant in terms of eligibility, the solution is to give the person a baby – a baby that does not necessarily have to be genetically linked to either parent – and the methods to achieve this can vary but do not imply curing infertility. The family planning campaigns and the epistemological perspective brought from abroad by both local and foreign physicians introduced a mind-set, which allowed reproduction to be considered as a biotechnologically manipulable matter and separated the couple from reproduction.

While, the three elements discussed above contributed to the acceptance of assisted reproduction as a way of dealing with infertility (dealing not being the same as curing), the following ones contributed to the emergence of the assisted reproduction industry. Assisted reproductive technology is costly and complicated, and opening a clinic requires economic investment and trained staff, hence for many aspiring assisted reproduction specialists associating with colleagues was necessary, and probably the only way of opening a private clinic. This, together with the daily practical demands of the assisted reproduction protocols, established the conditions for clinicians to work as collaborating teams, giving rise to the assisted reproduction clinic. This assisted reproduction clinic became an entity, independent of the physician, making the recipients of the treatments patients (clients) of the clinic, rather than of the physician. Assisted reproduction clinics acquired a name, a logo and a website and they adopted marketing campaigns similar to those used by other businesses (for example, the cosmetic surgery industry), but which were not commonly used by individual physicians. All this established a new way of practicing medicine. As described earlier, the assisted reproduction industry has a particular way of offering healthcare, one that is very different from other sectors of healthcare. These particularities concern the way in which service providers (physicians, nurses and biologists) and users (patients) relate to each other, the clinics’ corporate-like configuration and its use of marketing strategies. In Mexico, patients and physicians were used to a face-to-face interaction in a medical setting. Physicians, as professionals, did not have a website, a Facebook page, a Pinterest profile or a Twitter account. Now they advertise and interact with patients online and through these social media portals. The effects of this new way of relating requires further research and perhaps even regulation, particularly considering what is being said in marketing strategies; for example, some clinics advertise by quoting high success rates and offering deals where they assure ‘you get a baby or your money back’. (Ingenes, television advertisement).

This paper also looked at how a particular biotechnology was adopted and adapted in one particular context. At different points in Mexico’s assisted reproduction history, different assisted reproductive technology treatments have been crucial for its conformation. AI, for example, served to frame infertility as an illness, as a condition that can be and should be cured. This framing unified physicians dealing with infertility to react against this procedure, which they considered was merely a bypassing strategy and not a technique for curing the condition. Years later, GIFT marked the beginning of the high-complexity assisted reproductive technology service, both because its developers participated in the training of the first generations of assisted reproduction specialists and because it was with this technique that Mexico claimed its first successful case of medically assisted conception. Hence, in Mexico assisted reproduction has been more than just IVF and the techniques that came after it, even if today IVF and ICSI are the prominent techniques and GIFT is hardly ever used (Zegers-Hochschild et al., 2016).

Finally, this paper also analysed the way in which assisted reproduction is regulated in Mexico. It sought to highlight that both assisted reproduction practitioners and non-practitioner policymakers are engaged in the task of generating appropriate regulations and guidelines for the offering of assisted reproduction services. However, with the information available it has not been possible to determine why no regulation has yet been agreed upon. Further research is needed in this respect. Likewise, it has not been possible to examine closely the controversial and shifting business of surrogacy, due precisely to its volatility. Indeed, during the writing of this paper, the Mexican state of Tabasco went from being a place that had a flexible surrogacy law, making it attractive to those interested in surrogacy (e.g. gay couples), to becoming yet another location with a restrictive law imposed to limit reproductive tourism.

This paper has laid out the first overview of how assisted reproduction emerged and developed in Mexico. In doing so, it has also identified areas that need further exploration. For example, there is need for a more detailed analysis of the professional biography of clinicians and biologists, to find out where they were trained, to understand the reasons behind the selection of a particular model for establishing a new clinic (i.e. the network model or the outsourcing model), and to track how the different clinical and laboratory practices were developed. Likewise, we still need to follow closely the regulatory efforts in order to see, on the one hand, how, if and when a national regulatory framework is established, and on the other, if and how individual practitioners and clinics follow those professional guidelines that do exist.

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