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NEW REPRODUCTIVE TECHNOLOGIES

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Introduction

Since the 1980s, in vitro fertilization (IVF) and other forms of assisted reproductive technology (ART) have rapidly globalized, spreading into many parts of the Middle East. This is due in large part to the enthusiastic reception of these technologies by Islamic religious authorities, some of whom have framed their acceptance of ARTs in gendered terms. This chapter examines how the emergence of IVF and related ARTs has led to multiple social and cultural transformations in the reproductive lives of Middle Eastern women. Some of these changes have been quite positive, as ARTs have increasingly been used to overcome female (and male) infertility, making Middle Eastern couples parents. However, ARTs have also had led to questionable gender outcomes, the importance of which will also be explored in this chapter.

Overall, the theme of this chapter is emergence: the emergence of a variety of new ARTs; the emergence of an ART sector in the Middle East; the emergence of Sunni Islamic bioethical discourses surrounding ARTs; the emergence of third-party reproductive assistance in the Shi'i-dominant countries of Iran and Lebanon; and finally, the emergence of both positive and negative gender effects, some of which pose difficult social challenges for Middle Eastern women and bioethical challenges for the Middle Eastern region as a whole.

This chapter is based on long-term research undertaken in IVF clinics in four Middle Eastern countries, Egypt (Inhorn 2003), Lebanon (Inhorn 2012), the United Arab Emirates (Inhorn 2015), and Iran (Tremayne 2009, 2012). The chapter traces how divergent Sunni and Shi'a Muslim religious discourses in these Middle Eastern countries have affected the practice of ARTs. This is especially true for third-party reproductive assistance (e.g., egg donation, surrogacy), which has had significant effects on Middle Eastern women's reproductive lives (Inhorn and Tremayne 2012). This chapter examines these gender effects, attending to what we call the bioethical aftermath of ARTs across the Middle Eastern region (Inhorn and Tremayne 2016).

The Emergence of ARTs

In his seminal essay, "Dominant, Residual, and Emergent," social theorist Raymond Williams (1978) defined "emergence" as "new meanings and values, new practices, new relationships and kinds of relationship, which are continually being created" (123). The term "emergence"

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has great relevance in the world of ARTs – a world that came into being with the 1978 birth of England's Louise Brown, the world's first test-tube baby. IVF was the biological platform technology for all that would follow (Franklin 2013). In IVF, a woman's ovaries are hormonally stimulated to produce excess eggs. These eggs are then removed from a woman's ovaries and placed into a petri dish in an IVF laboratory. Spermatozoa retrieved from the male partner (usually through masturbation) are then placed with the eggs into the petri dish with the goal of an in vitro (i.e., outside of the body) conception. Successfully fertilized embryos are then transferred into the woman's uterus in the hope that one or more will implant to create a viable pregnancy.

Since the birth of IVF more than 40 years ago, there has been a veritable explosion of related ARTs. These include: 1) intracytoplasmic sperm injection (ICSI) to overcome male infertility; 2) third-party reproductive assistance (with donor eggs, sperm, and embryos) to overcome problems of poor gamete quality; 3) gestational surrogacy to help women who are unable to carry a pregnancy in their own uterus; 4) cryopreservation (freezing) and storage of unused sperm, embryos, eggs, and now ovaries; 5) mitochondrial transfer from a healthy human egg to the diseased egg of another woman; 6) preimplantation genetic diagnosis (PGD) to determine if embryos have genetic defects; 7) preimplantation genetic screening (PGS) to select embryos of a specific sex or to select embryos that can grow into savior siblings through the donation of their umbilical cord blood; 8) human embryonic stem cell (hESC) research on unused embryos for the purposes of therapeutic intervention; and 9) the future possibility of human reproductive cloning, or asexual, autonomous reproduction, which has already occurred in other mammals (e.g., Dolly the sheep) (Franklin 2007). With virtually all of these technologies, sperm and eggs are retrieved from bodies, embryos are returned to bodies, and sometimes they are donated to other bodies or used for the purposes of stem cell and other forms of medical research.

The Emergence of a Middle Eastern ART Sector

IVF globalized quickly, moving to the Middle East within eight years of Louise Brown's birth. Today, the Middle East is home to a booming high-tech ART industry (Inhorn and Patrizio 2015). Egypt alone boasts more than 70 IVF clinics, Iran has more than 60 clinics, and Turkey has the largest number, with more than 150 clinics (IFFS 2019). Even a small country such as the United Arab Emirates hosts more than a dozen IVF centers, including two supported by the Emirati state (Inhorn 2015). Of all the regions of the world, the Middle East can now claim one of the largest and most successful IVF sectors. For example, among the 48 countries performing the most ART cycles per million inhabitants by 2010, eight Middle Eastern Muslim countries could be counted, including Lebanon (6th), Jordan (8th), Tunisia (25th), Bahrain (28th), Saudi Arabia (31st), Egypt (32nd), Libya (34th), and the UAE (35th) (Adamson 2009).

This success has been supported by government efforts in some parts of the Middle Eastern region to subsidize IVF through public clinics and health insurance schemes, thereby making otherwise costly ARTs (at USD $2000–6000 per cycle) more accessible for all. Algeria, Egypt, Iran, Turkey, and the UAE have all offered some form of public financing, either through insurance reimbursement (Algeria and Turkey) or government-sponsored IVF clinics for the poor (Egypt, Iran) (Inhorn 2015).

Turkey stands out in this regard (Gürtin 2016). In 2005, Turkey began fully funding two IVF cycles for all Turkish citizens when the Turkish Ministry of Health began to provide IVF health insurance redeemable at both state and private clinics. Since then, the demand for IVF in Turkey has dramatically increased, causing a doubling in the number of IVF clinics

in the country – from 66 in 2005 to more than 150 in 2019, the largest number in any single Middle Eastern country (IFFS 2019). As shown by medical sociologist Zeynep Gürtin (2011, 2016), the ability of Turkish couples of all social classes and backgrounds to access IVF has had dramatic and positive effects on demand for ART services, especially among poorer segments of the Turkish population. The Turkish example provides compelling evidence that low-income infertile couples, both men and women, benefit tremendously when ART services are provided for free or at very low cost. In the Middle East, at least, Turkey has made an exceptional national commitment to overcome its unmet need for ART, providing affordable IVF for all.

The Emergence of Sunni Islamic Bioethical Discourses

The development of a successful Middle Eastern IVF industry has also been supported by the region's religious establishment. This is not surprising, in that Islam encourages the use of science and medicine as solutions to human suffering (Lotfalian 2004). Furthermore, pronatalist tendencies are found in the Islamic scriptures, which describe the importance of growing an Islamic multitude (Inhorn 1996).

In the Middle East, IVF was first practiced in 1986 in the Sunni Muslim-majority countries of Egypt, Saudi Arabia, and Jordan. Egypt's early entrance into assisted reproduction was especially important from an Islamic standpoint (Inhorn 2003; Serour 2008). The Grand Shaykh of Egypt's renowned religious university, Al Azhar, issued the first widely authoritative *fatwa* on assisted reproduction on March 23, 1980 – only two years after the birth of the first IVF baby in England but a full six years before the opening of Egypt's first IVF center.[1] Nearly 40 years later, this original Al-Azhar *fatwa* has proved quite authoritative and enduring. It has been reissued many times in Egypt and subsequently reaffirmed by *fatwa*-granting authorities in other parts of the Sunni Muslim world, from Morocco to Saudi Arabia to Indonesia.

Beginning with the original Al-Azhar *fatwa*, the Sunni approach to ARTs has been generally permissive, deeming IVF a religiously acceptable technology for Muslim IVF physicians and their patients. As new ARTs have continued to emerge, the following techniques have all been considered *halal*, or religiously permissible, and are thus practiced in IVF clinics across the Middle Eastern region. These permitted acts include:

1 Artificial insemination with a husband's sperm;
2 In vitro fertilization of an egg from a wife with the sperm of her husband;
3 Intracytoplasmic sperm injection, in which the sperm of a husband is injected into the egg of his wife;
4 Cryopreservation, or freezing, of any excess embryos, as well as sperm and eggs to be used later by the same individual(s) within their lawful marriage;
5 Post-menopausal pregnancy using a wife's own cryopreserved embryos or oocytes, in combination with the sperm of her husband;
6 Preimplantation genetic diagnosis for couples at high risk of genetic disorders in their offspring;
7 Preimplantation genetic screening for couples with children of only one sex, who wish to pursue gender selection for the purposes of family balancing;
8 Multifetal pregnancy reduction, a form of selective abortion, which eliminates one or more fetuses in a high-risk IVF pregnancy with triplets, quadruplets, or beyond. In general, Islam is permissive when it comes to therapeutic abortion, especially when preventing harm or loss of life of either the mother or remaining fetuses;

9 Embryo research on excess embryos that are donated by couples for the advancement of scientific knowledge and the benefit of humanity; and
10 Uterine transplantation, a newly emergent technique in which a healthy uterus is transplanted from a willing donor to another woman who is lacking a competent uterus. Initially tried in Saudi Arabia, the goal of this procedure is to achieve a successful IVF pregnancy in the transplanted uterus.

This clearly represents a substantial list of permissions, thereby fueling the development of a robust IVF industry across the Sunni Muslim world, which constitutes about 90 percent of the world's Muslims, including in the Middle Eastern region (Inhorn and Tremayne 2012; Pew Research Center 2009). However, the list of ART restrictions is almost as long. Beginning with the original Al-Azhar *fatwa*, Sunni religious authorities in countries as diverse as Egypt, Morocco, Saudi Arabi, and Turkey have agreed that some ART practices are *haram*, or religiously forbidden, and thus cannot be clinically practiced. The following is a list of such forbidden techniques:

1 Third-party reproductive assistance is not allowed, whether third-party donors are providing sperm, eggs, embryos, or uteruses, as in surrogacy. Even with no physical touch or gaze, the use of a third party is considered tantamount to *zina* (illicit intercourse, adultery).
2 Similarly, all forms of surrogacy are strictly forbidden.
3 A donor or surrogate child conceived through any of these illegitimate forms of assisted reproduction cannot be made legitimate through adoption.[2] The child who results from a forbidden method belongs to the mother and is considered a *walad al-zina*, or an illegitimate child.
4 Assisted reproduction cannot be performed on an ex-wife or widow using sperm from a divorced or dead husband (i.e., posthumous reproduction).
5 Sperm banks for the purposes of sperm donation are forbidden. Sperm may only be used when cryopreserved before cancer treatment and then employed later in life by that same individual.
6 Genetic alteration of embryos for the purpose of trait selection (i.e., so-called designer babies) is forbidden. However, in the future, gene therapy may be approved to remediate inherited genetic diseases and pathological conditions.
7 Human reproductive cloning for the creation of a cloned child – who would theoretically be the genetic twin of the cloning parent – is forbidden.

From a clinical perspective, the most important prohibition is the first: that all forms of third-party reproductive assistance, including sperm donation, egg donation, embryo donation, and surrogacy, are *haram* (Gürtin 2016; Inhorn 2003, 2015; Shabana 2015). As noted by Islamic legal scholar Ebrahim Moosa (2003),

> In terms of ethics, Muslim authorities consider the transmission of reproductive material between persons who are not legally married to be a major violation of Islamic law. This sensitivity stems from the fact that Islamic law has a strict taboo on sexual relations outside wedlock (*zina*). The taboo is designed to protect paternity (i.e., family), which is designated as one of the five goals of Islamic law, the others being the protection of religion, life, property, and reason.
>
> (23)

With regard to the first issue, Islam is a religion that can be said to privilege – even mandate – heterosexual marital relations, as is made explicit in the original Al-Azhar *fatwa*. In general

terms, reproduction outside of marriage is considered *zina*, or adultery, which is religiously forbidden. Although third-party reproductive assistance does not involve the sexual body contact (touch or gaze) of adulterous relations, nor presumably the desire to engage in an extramarital affair, it is nonetheless considered by most Islamic religious scholars a form of adultery by virtue of introducing a third party into the sacred dyad of husband and wife. It is the very fact that another man's sperm or another woman's eggs enter a place where they do not belong that makes donation of any kind inherently wrong and threatening to the marital bond.

The second aspect of third-party donation that troubles marriage is the potential for incest among the offspring of anonymous donors. If an anonymous sperm donor, for example, fathers hundreds of children, the children could grow up, unwittingly meet each other, fall in love, and marry. The same could be true for the children of anonymous egg donors. Thus, moral concerns have been raised about the potential for incest to occur among donor children who are biological half-siblings.

The final moral concern is that third-party donation confuses issues of kinship, descent, and inheritance. As with marriage, Islam is a religion that can be said to privilege – even mandate – *nasab*, or the genealogical origins of each child, as spelled out clearly in the original Al-Azhar *fatwa*. Preserving each child's genealogical connection to a known biological mother and father is considered not only an ideal in Islam but a moral imperative. The problem with third-party reproductive assistance, therefore, is that it destroys a child's *nasab* and violates the child's legal rights to known biological parentage, which is considered immoral, cruel, and unjust.

Sunni Muslim IVF patients use the term "mixture of relations" to describe this untoward outcome. Such a mixture of relations, or the literal confusion of lines of descent introduced by third-party donation, is described by patients in their own terms as being very "dangerous," "forbidden," "against nature," "against God" – in a word, *haram*, or morally unacceptable (Inhorn 2003). It is argued that donation, by allowing a "stranger" to enter the family, confuses lines of descent (Inhorn 2006). For men in particular, ensuring paternity and the purity of lineage through known fathers is of paramount concern (Inhorn 2012). This is because virtually all Muslim societies are organized patrilineally – that is, descent and inheritance are traced through fathers and the fathers of fathers through many generations. Thus, knowing paternity is of critical concern (Clarke 2009).

Accordingly, at the ninth Islamic law and medicine conference, held under the auspices of the Kuwait-based Islamic Organization for Medical Sciences (IOMS) in Casablanca, Morocco, in 1997, a landmark five-point declaration included recommendations to prohibit all situations in which a third party invades a marital relationship through donation of reproductive material (Moosa 2003). Such a ban on third-party reproductive assistance is effectively in place in the Sunni-dominant countries.[3] Not a single Sunni Muslim-majority country in the Middle East allows third-party gamete or embryo donation or surrogacy. Couples who need these technologies are often told firmly that third-party donation is "against the religion," or they are encouraged to travel outside the Middle Eastern region to pursue these forms of third-party reproductive assistance (Inhorn 2015).

The Emergence of Shi'i Islamic Third-Party Reproductive Assistance

The situation is quite different for Shi'i Muslims, who constitute slightly more than 10 percent of the world's Muslim population (Pew Research Center 2009). Iran is the current epicenter of the Shi'i world, where Shi'a Islam constitutes the majority religion. Shi'i majorities (or, at least, voting pluralities) are also found in Lebanon, Iraq, and Bahrain, and significant Shi'i

minority groups are found in eastern Saudi Arabia, Syria, and Turkey, as well as Afghanistan, Pakistan, and India.

Some Shi'i religious authorities continue to support the majority Sunni Islamic view; that is, they agree with Sunni fatwas that prohibit third-party reproductive assistance. However, in the 1990s, Shi'i clerics in Iran began supporting third-party reproductive assistance, particularly egg donation but sometimes also sperm donation (Tremayne and Akhondi 2016). Indeed, most leading Shi'i clerics have allowed third-party reproductive assistance over the past 20 years. This includes the Supreme Leader of the Islamic Republic of Iran, Ayatollah Ali al-Husseini al-Khamenei, the hand-picked successor to Iran's Ayatollah Khomeini, who issued an authoritative fatwa effectively permitting both egg and sperm donation to be used (Tremayne and Akhondi 2016).[4] Ayatollah Khamenei's fatwa justified these donor technologies as a "marriage savior," preventing the "marital and psychological disputes" that would otherwise arise from remaining childless indefinitely. Subsequently, in Iran, ARTs, including third-party reproductive assistance, have been justified using "happy family" rhetoric (Tremayne 2012). That is, infertility is assumed to lead to the breakdown of a marriage, if left untreated, and thus, all forms of reproductive assistance are justified.

Indeed, these Shi'i *fatwas* have led to what some scholars have described as an "Iranian ART revolution" (Abbasi-Shavazi, Inhorn, Razeghi-Nasrabad, and Toloo 2008). Since the new millennium, all forms of sperm donation, egg donation, embryo donation, and gestational surrogacy are taking place in Iran. Iran is also leading the way into a Middle Eastern stem cell industry (Saniei 2012).

This millennial moment in Iran has also had a major impact in Lebanon, with its significant Shi'i population (Inhorn 2012). By 2003, one of the major Shi'i-serving IVF clinics in Beirut had developed a full-fledged egg donation program and had begun to cater to so-called reproductive tourists coming from other parts of the Sunni-dominant Middle East. Soon other IVF clinics in Lebanon began providing egg donation services, as market demand increased among both Shi'i and Sunni Muslims, as well as Middle Eastern Christian couples. Indeed, it is fair to say that the development of third-party reproductive assistance programs in both Iran and Lebanon has weakened the regional Sunni Muslim ban on donor technologies, as infertile Sunni Muslim couples increasingly turn to other countries to solve their infertility problems through the use of third-party reproductive assistance.

The Emergence of ART Gender Effects

The divergent stances of Sunni and Shi'i religious authorities (via their *fatwas*) toward ARTs and third-party reproductive assistance have had significant gender effects, impacting the lives of Middle Eastern women in various ways. On the one hand, the religiously supported emergence of a variety of ARTs in both Sunni- and Shi'i-dominant Middle Eastern countries has created new hope for infertile couples, encouraging them to pursue these technologies in their quests for conception (Inhorn 1994). Overall, increasing access to ARTs across the Middle East appears to be changing gender relations via new knowledge and attitudes, including: 1) increased understanding of both male and female infertility among the general population; 2) normalization of both male and female infertility problems as medical conditions that can be overcome; 3) decreased stigma, blame, and social suffering for both men and women, particularly women, who bear the major social burden of infertility when they do not become pregnant; 4) increased marital commitment as husbands and wives seek ART services together; and 5) increased male adoption of ARTs, especially for male infertility problems, which are involved in at least 60 percent of all cases of childlessness in

the Middle Eastern region (Inhorn 2012). In other words, the coming of ARTs to the Middle East has had major salutary impacts on marriage and gender relations more generally (Inhorn 2003, 2012). As infertile Middle Eastern couples remain together in their searches for ARTs, the demand for these services also grows, fueling the continual expansion of the Middle Eastern IVF sector.

Having said that, some ART gender effects have led to constraints and uncertainties in the lives of Middle Eastern women. First, the success rates of IVF and other ARTs continue to be low (e.g., 20–40 percent), leading to endless rounds of fruitless repetition for many couples. For women, IVF involves a physically grueling procedure, as it is highly dependent upon the complicated stimulation and extraction of healthy oocytes (i.e., eggs) from women's bodies. Women's fertility is highly age sensitive, with oocyte quality diminishing at later stages of the reproductive life cycle (i.e., slightly at age 32 but significantly at age 37). Thus, older women may age out of IVF, causing highly gendered, life-course disruptions surrounding women's biological clocks. Sunni Muslim women whose egg quality has declined irrevocably are not allowed to use donor eggs, effectively ending any possibility of biological motherhood and increasing their risk of marital dissolution.

Given this potentiality, egg donation has been cast as a marriage savior in Shi'i bioethical discourses, with the majority of Shi'i jurists now allowing the practice. For infertile women who receive a donated egg, the fact that they can gestate, give birth to, and breastfeed the egg-donor child creates the bonds of *rida'*, or milk kinship (Altorki 1980; Khatib-Chahidi 1992). Thus, husbands sympathetic to their wives' infertility problems may become active participants in obtaining donor eggs, sometimes engaging in *mut'a*, or temporary marriages (Haeri 2002), in order to undertake egg donation within the remit of a temporary polygynous marriage (Inhorn 2012). This use of temporary marriage as a way to make egg donation morally permissible is a creative Shi'i solution to the challenges posed by third-party reproductive assistance within an Islamic framework.[5]

Perhaps not surprisingly, many infertile Shi'i Muslim couples prefer to use their close relatives, especially same-sex siblings, for egg donation, as well as gestational surrogacy. Thus, sisters donate their eggs or uteruses (via surrogacy) to their infertile sisters and sisters-in-law. But if a sister donates her eggs to her brother's infertile wife, the child so produced would be the biological offspring of the actual brother and sister – a form of biological incest not only in Islamic societies but in most if not all societies around the world. Furthermore, under Islamic law, this kind of intrafamilial donation may lead to peculiar forms of relatedness and the possibility of committing incest or adultery according to the Islamic laws governing association between the sexes.

The extent of social and sexual interaction between men and women is regulated through the concept of *mahramiat* (closeness/privacy), which determines the boundaries of the interaction between men and women in society. Accordingly, men and women are divided into two groups – the *mahram* and *na-mahram*. The *maharem* (plural for *mahram*) are relatives, who are not potential marriage partners and with whom one may undertake free but not sexual interaction. Any sexual relationship between the *maharem* therefore constitutes incest. The *mahram* group includes one's siblings, parents, grandparents, aunts and uncles, children, and grandchildren. *Na-mahram*, on the other hand, are non-family members, who are potential marriage partners and with whom neither sexual nor social contact is permitted. Social contact with *na-mahram* individuals is supposed to remain limited and guarded. This latter category includes all non-family members, as well as those members of the kin group who are not part of the *mahram* category. There also exists a third category, those who are *mahram*

at some point but who become *na-mahram* due to changes in the individuals' marital status (see also Behnam 1973).

In the case of third-party reproductive assistance within the kin group, egg donation between sisters and brothers' spouses may violate the rules of *mahramiat* while also leading to both incest and adultery. Yet infertile couples who recruit their own relatives as egg donors typically do not see their actions in this light. Because there is no sexual contact occurring during the donation process – in which eggs and sperm retrieved from individuals' bodies are placed in petri dishes and made into embryos there – ARTs allow family members to bypass the rules of *mahramiat*, as well as feelings of incest or adultery. Instead, by using a relative's egg (or sperm), the purity of the lineage can be maintained, and the donation can be kept all in the family, strengthening those social bonds. Furthermore, the financial aspect of familial donation is also advantageous, as it typically does not entail payment to the donor.

Yet increasingly, intrafamilial egg donation and gestational surrogacy are leading to bioethical conundrums (i.e., biological incest) and social repercussions for women. For example, once a donor-egg or surrogate child is born, the infertile woman may be asked to relinquish the child to other family members who decide to stake their biological claims. Such difficult cases have increased over time in Iranian ART clinics, leading to virulent family disputes that are not easy to resolve (Tremayne 2022). As a result, legislation is currently being drafted in Iran to make all third-party reproductive assistance strictly anonymous, thereby avoiding the complexities of known donation between family members.

With or without third-party reproductive assistance, infertile Middle Eastern women's lives can be affected for better or for worse, depending upon a woman's particular circumstances, her religious affiliation, and the supportiveness of her husband and other family members. Access to ARTs can be a great boon to infertile Middle Eastern women when they become mothers of IVF offspring (Inhorn 2003, 2015). But, as described, ARTs can also produce profound difficulties, disappointments, and bioethical conundrums for Middle Eastern women and for societies as a whole.

For example, one of the bioethical consequences of ARTs now being seen across the Middle East is the emergence of gender selection (Shabana 2017; Zaviš 2018). Although son preference and daughter discrimination are anathema in Islam – with the Prophet Muhammad explicitly forbidding the pre-Islamic practice of female infanticide – the emergence of ARTs, particularly PGD, is leading to a new form of female embryocide in the Muslim world. That is, in some Middle Eastern IVF clinics, couples who want sons, especially after the birth of only daughters, are using IVF with PGD to perform sex selection, culling IVF-created female embryos in an attempt to produce male-only progeny (Inhorn 2015, 2022; Serour, 2008). Furthermore, new forms of feticide are also occurring in many Middle Eastern IVF clinics through selective abortion of fetuses in high-order multiple pregnancies (i.e., triplets and beyond) when too many embryos are returned to a woman's uterus during an IVF cycle (Inhorn 2015; Serour 2008).

Like the ART-abetted forms of biological incest occurring in Iran, these "selective" reproductive practices of embryo and fetal culling, especially of female embryos, are producing new conundrums (Wahlberg and Gammeltoft 2017). However, these are part of the bioethical aftermath of ARTs in the Muslim Middle East, a world where the widespread acceptance and use of ARTs has not been entirely unambiguous (Inhorn and Tremayne 2016). Indeed, the emergence of ARTs has led to a bioethical slippery slope, where technologies intended for one use may morph into another, as shown in the case of PGD-assisted sex selection, which

may be leading to new instantiations of son preference and daughter discrimination, as well as irremediable alterations in male-to-female sex ratios (Inhorn 2022).

Conclusion

As this chapter has shown, the Middle East has embraced new ARTs with considerable enthusiasm while, at the same time, attempting to regulate them in accordance with local religious mores. In the Sunni Muslim Middle Eastern countries such as Egypt, Morocco, Saudi Arabia, and Turkey, the prohibition on third-party reproductive assistance has clearly led to an entrenchment of deeply held religious beliefs about the importance of marriage, biological kinship, and family life, which no third party should tear asunder. For this reason, third-party donation of eggs and sperm continues to be morally shunned and clinically banned in the Sunni Muslim world, with donation itself equated with *zina*, or adultery. Nonetheless, this prohibition on egg donation has major implications for infertile Middle Eastern women, especially those facing age-related fertility decline and the potential permanent end of their chances for biological motherhood.

Yet, having said this, the globalization of ARTs to other parts of the Shi'i Middle East has fundamentally altered understandings of the ways in which families can be made and the ways in which infertile marriages can be saved through the uses of ARTs. The permission of donor technologies in Iran and Lebanon has led to a brave new world of reproductive possibility never imagined when these technologies were first introduced to the Middle Eastern region more than 35 years ago. This emergence of donor technologies has led to, among other things, significant reproductive tourism from the Sunni to Shi'i regions of the Middle East; the mixing of gametes across familial, ethnic, national, and religious lines; and the birth of thousands of donor children to infertile Middle Eastern couples. Many infertile couples have also begun to reconsider traditional notions of kinship, which, in Iran, means incorporating their own biological kin into ART-assisted reproductive processes but with outcomes that have proven highly unpredictable, especially for infertile women.

Indeed, these gender effects of ARTs are still playing out across the Middle Eastern region in ways that need to be followed by future gender scholars. With the emergence of even newer ART possibilities – including IVF babies from transplanted uteruses, postmenopausal conceptions from a woman's own cryopreserved eggs, and the large-scale disposal of IVF-generated female embryos in the regional pursuit of sons – the implications for Middle Eastern women's (and girls') lives are profound, reflecting both the promises and pitfalls of new reproductive technologies in the 21st century.

Notes

1 Although a *fatwa* is non-legally binding, it is generally regarded as an authoritative Islamic religious decree, offered by an Islamic cleric who is considered an expert in Islamic jurisprudence.
2 Legal adoption, in which a child takes the name and inheritance of its adoptive parents and is considered like a biological child, is not practiced in most Muslim countries. Although guardianship of orphans is encouraged, legal adoption is disallowed in Islam.
3 The possible exception is Mali, where at least one IVF clinic is performing third-party reproductive assistance (Horbst 2016).
4 To date, however, Ayatollah Khamenei is the only major Shi'i cleric to have approved of sperm donation. See Clarke 2009 and Inhorn 2012.
5 However, *mut'a* marriages are not allowed in Sunni Islam.

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