

VOLUME 8 ISSUE 1

2023

ZULEYHA KESKIN
Editor-in-Chief

SULEYMAN SERTKAYA
Managing Editor

MIRELA CUFUROVIC
Assistant Editor



Published online: 10 June 2023



[Submit](#) your article to this journal



[View](#) related and/or other articles in this issue

Retracing the Islamic Prohibition on Genetic Gestational Surrogacy (Uterine Service) for Married Couples: Scientific and Analogical Perspectives

Ayesha Alvi and Mohammed Rizwan

To cite this article:

Alvi, Ayesha and Mohammed Rizwan. "Retracing the Islamic Prohibition on Genetic Gestational Surrogacy (Uterine Service) for Married Couples: Scientific and Analogical Perspectives." *Australian Journal of Islamic Studies* 8, no. 1 (2023): 62-87.

RETRACING THE ISLAMIC PROHIBITION ON GENETIC GESTATIONAL SURROGACY (UTERINE SERVICE) FOR MARRIED COUPLES: SCIENTIFIC AND ANALOGICAL PERSPECTIVES

Ayesha Alvi* and Mohammed Rizwan**

Abstract: Assisted reproduction involving a third party (sperm, ova or uterus) in procreation has invited fierce debate among Muslim scholars all over the world and the two main theological schools of Islam – Shi’ah and Sunni – have responded to it differently. In Shi’ah Islam, it is permissible, while in Sunni Islam, it is prohibited and this prohibition enjoys endorsement from leading religious clergies (*ulama*) across the spectrum.

This paper opens a novel paradigm regarding prohibitions on availing uterine services to gestate an embryo (baby in the early developmental stage post-fertilisation) created from the gametes of the married intended couple for developmental purposes (genetic gestational surrogacy) from analogical and scientific references in conjunction to Qur’anic citations. It considers that wet nursing and gestational surrogacy are societal services and share undeniable biogenesis characteristics. The argument is novel in our knowledge and has not previously been so comprehensively given in written form with such explicit scientific evidences. The parallels between genetic gestational surrogacy and wet nursing/foster motherhood are discussed, with reference to mainstream arguments on the purity of lineage, sanctity (*hurmat*) of surrogate women and sacredness of the womb.

Key aspects of gestational surrogacy and wet nursing are elaborated alongside departure points between contemporary surrogacy and Islam-inspired surrogacy.

Keywords: *Assisted reproductive technology, Islamic perspective, surrogacy, wet nursing*

* Corresponding Author. Group Head, Islamic Bioethics, Centre for Study and Research, New Delhi, Former Head, Department of Genetics and Molecular Biology, College of Applied Medical Sciences, Jazan University KSA.

** Group Head, Islamic perspectives in Disruptive Technologies, and Deputy Director, Centre for Study and Research, New Delhi.

INTRODUCTION

Recent advancements in the field of assisted reproductive technologies (ART) to treat infertility have significantly challenged society's religious, ethical, legal and moral norms regarding biological family kinship, the essence of motherhood (bearing a foetus in the womb), fatherhood (contributing the sperm and providing livelihood) besides seizing collective social and legal parenthood status.¹ In all aspects, instigation of ART not only muddles the purity of lineage and socio-legal parentage with a traditional biological parentage model but has fragmented human reproductive functions and traditional kinship ideology into various spellbinding outcomes. First, it separates marital sexual relationship from reproduction; second, it subdivides traditional motherhood into biological, social and gestational components; and third, it divides the unity of potential family relationships with the involvement of a third person.

Basically, ART is a cluster of different techniques that are used directly or in combination with surrogacy to fulfil the desire of an infertile couple to have a child.² Bioethically, the main indications for surrogacy are: absence of a uterus or the uterus is too small, repeated IVF failures, cancer or another medical condition for which pregnancy is contraindicated.³ However, its increasing use by people on the LGBTQIA+ spectrum and singles has not only jeopardised its altruistic grounds but raises myriad sociolegal issues for the child, especially if the surrogate woman is married or intended parent(s)/couple⁴ avail gamete donor services.

¹ Bridget Taylor, "Whose Baby, is it? The Impact of Reproductive Technologies on Kinship," *Human Fertility Cambridge England* 8, no. 3 (2010), <https://doi.org/10.1080/14647270500277693>; Gajendra K. Goswami, "The Genetic Truth of Surrogate Parentage," *Medical Legal Journal* 83, no. 4 (2015), <https://doi.org/10.1177/0025817215576877>.

² Meaghan Jain and Manvinder Singh, *Assisted Reproductive Technology (ART) Techniques* (Treasure Island, FL: Statpearls Publishing, 2021).

³ Matts Brännström et al., "Uterus Transplantation: A Rapidly Expanding Field," *Transplantation* 102, no. 4 (2018), <https://doi.org/10.1097/TP.0000000000002035>; Nastaran Aflatoonian et al., "Surrogacy as a Good Option for Treatment of Repeated Implantation Failure: A Case Series," *Iranian Journal of Reproductive Medicine* 11, no. 1 (2013).

⁴ A couple who cannot conceive or carry a pregnancy to term on their own so choose to have a child through surrogacy. Once the child is born, they accept that child.

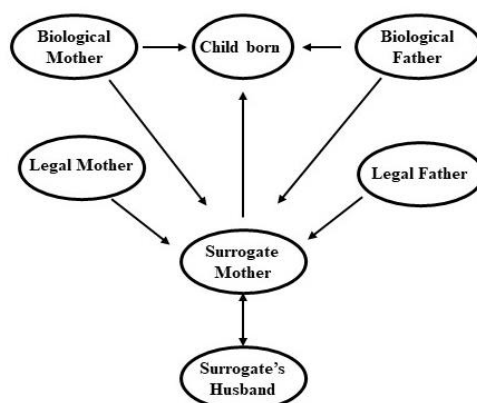


Figure 1: A socio-legal and biological parentage model based on third-party assisted reproduction

In spite of all these messy situations, ART, including surrogacy, is legally practiced in the contemporary world (Western and Asian countries) as long as it abides by the laws of the land.⁵ However, the Islamic world is in dissent over the issue. Ayatollah Ali Hussein Khomeini (the supreme leader of Iran) has approved all third-party contributions⁶ (sperm, ova and uterus) in procreation under a temporary marriage contract⁷ (*mut'a*) and enacted a religious verdict (*fatwa*⁸). Until recently, few Shi'ah religious jurors were supportive, being apprehensive over ascertaining lineage or determining a licit fatherhood/parenthood relationship and forbidding a sperm donor proviso in procreation;⁹ however, hiring a uterus (genetic gestational surrogacy) is still practiced, enjoying social and religious support. As per Shiite theology, an embryo is a different entity as it is baby in the early developmental stage composed of gametes (ova or sperm) so there is no infringement on religious statutes or confusion of lineage, as the intended married couple are well-known and can be considered the “real parents.”

Sunni Islam, on the other hand, first imposed an absolute prohibition on third-party assisted reproduction when using egg, sperm or even a uterus in procreation on the basis of Islamic jurisprudence (*Maqasid al-Shari'ah*).¹⁰ After a little while, authorities sympathetically revisited their blanket prohibition to consider genetic gestational surrogacy (uterine services) only within the sphere of valid bigamy (inseminating the ova of the intended legitimate wife with the husband's sperm and implanting the resulting embryo into the uterus of another legitimate wife of the same husband), primarily to ease family distress and risk of marriage

⁵ Noelia Igareda González, “Legal and Ethical Issues in Cross-border Gestational Surrogacy,” *Fertility Sterility* 113, no. 5 (2020), <https://doi.org/10.1016/j.fertnstert.2020.03.003>.

⁶ Mohammad Jalal Abbasi-Shavazi et al., “The Iranian ART Revolution: Infertility, Assisted Reproductive Technology, and Third-party Donation in the Islamic Republic of Iran,” *Journal of Middle East Women's Studies* 4, no. 2 (2008).

⁷ Shahla Haeri, *Law of Desire: Temporary Marriage in Shi'i Iran* (New York: Syracuse University Press, 1989).

⁸ A nonbinding ethico-legal opinion issued by high rank religious scholars.

⁹ Marcia C. Inhorn and Soraya S. Tremayne, “Islam, Assisted Reproduction, and the Bioethical Aftermath,” *Journal of Religion Health* 55, no. 2 (2016), <https://doi.org/10.1007/s10943-015-0151-1>.

¹⁰ Gad El-Hak, “In Vitro Fertilization and Test Tube Baby” (Cairo, Egypt: Dar El Iftaa, 1980), *fatwa*, vol. 1225, 3213-3228.

breakdown. However, they soon retracted this religious verdict, stating it is still defying and complicating the Islamic parenthood/kinship status and creating confusion over the normative “real mother” status.¹¹ They extrapolate their pronouncement by referring to two Qur’ānic verses:

It is God who has given you spouses from amongst yourselves and through them he has given you children and grandchildren.¹²

None are their mother except those who gave birth to them.¹³

¹¹ Eighth Session of the Islamic Fiqh Council, held in Makkah Mukarramah, 18 Rabī‘ al-Akhir to 7 Jumādā al-Ūla 1405 AH (January 19-28, 1985).

¹² Qur’ān 16:72.

¹³ Qur’ān 58:2.

They argue that Islam bestows “real mother” status exclusively on the woman who holistically contributes towards procreation (conceives, gestates and nurtures the child)¹⁴ and not on the woman who provides genetic material or only gestates the child (surrogacy).¹⁵ Being settled on the core, they reason, although yearning for a child is instinctive besides being deemed as a blessing from Allah the Almighty,¹⁶ it is not an indispensable element of human life to jeopardise the overarching concerns of Islamic jurisprudence (Sharia): protection of lineage and progeny.¹⁷ Another relevant area in the backdrop of this ruling is that, unlike Shiite theology, family integrity in Muslims is viewed within the sphere of faithful lineage, kinship and parenthood and it is meticulously determined by any of three ways: consanguinity, marriage and breastfeeding.¹⁸ So, the jurists resolutely pleaded that, although Islam encourages the union of two heterosexuals for pleasure and progeny continuation within the marriage precincts,

It is He Who created you from a single person, and made his mate of like nature, in order that he might dwell with her (in love). When they are united, she bears a light burden and carries it about (unnoticed). When she grows heavy, they both pray to Allah their Lord, (saying): “If Thou givest us a goodly child, we vow we shall (ever) be grateful.”¹⁹

In truth, they consider the right to bear a child as a basic marital privilege but restrict people from taking any treatment that infringes Islamic jurisprudence. This curtails all the hopes genetic gestational surrogacy had instigated in Islamically married couples struggling with uterine problems. However, extensive research over the past few years in the field of embryology, genetic engineering and allied medical sciences gave renewed hope to Muslim married couples who were struggling for a child. With this backdrop, several scholars are now debating the legitimacy of the proscription on genetic gestational surrogacy provisos as few strong scientific evidences are undeniably proving the mainstream concerns of jurists are well looked after. Further on, a few scholars are arguing to approve genetic gestational surrogacy in consonance with highly respected and religiously rewarded wet nursing practices.²⁰ To add to

¹⁴ Yusuf al-Qaradawi, *Fatawa Mu'asirah* [Contemporary Fatawa] (Beirut: al-Maktab al-Islami, 2000). On August 3, the Islamic Research Association (IRA) of Al-Azhar Al-Sharif ratified the ‘Children’s Charter in Islam,’ drawn up by the Islamic World Council for Dawaa and Relief (IWCDR) Committee of Women and Children, in response to the United Nations Children’s Charter (April 2, 2004). The charter was drawn up by the elite of Arab and Muslim intelligentsia, including Dr. Yusuf al-Qaradawi, Dr. Mohammad Emara, Dr. Ali Gommah, Dr. Ahmad al-Assal, Dr. Soad Salih and Dr. Fathi Lashin.

¹⁵ Gamal I. Serour, Mohamed A. Aboulghar and Raaga T. Mansour, “Bioethics in Medically Assisted Conception in the Muslim World,” *Journal of Assisted Reproduction and Genetics* 12, no. 9 (1995), <https://doi.org/10.1007/BF02212574>.

¹⁶ Qur’ān 42:49-50.

¹⁷ Mohammed Ali Al-Bar and Hassan Chamsi-Pasha, *Contemporary Bioethics: Islamic Perspective* (New York: Springer International, 2015), eBook edition; Aasim I. Padela, Katherine Klima and Rosie Duivenbode, “Producing Parenthood: Islamic Bioethical Perspectives & Normative Implications,” *New Bioethics* 26, no. 1 (2020): 17-37, <https://doi.org/10.1080/20502877.2020.1729575>.

¹⁸ Qur’ān 4:23, 2:233; Bagher Larijani and Farzaneh Zahedi, “Ethical and Religious Aspects of Gamete and Embryo Donation and Legislation in Iran,” *Journal of Religion and Health* 46, no. 3 (2007): 399-408.

¹⁹ Qur’ān 7:189.

²⁰ Ghamadi Center of Islamic Learning, “Surrogacy in Islam, Surrogate Motherhood – Javed Ahmed Ghamidi,” YouTube video, 12:42, December 4, 2020, <https://www.youtube.com/watch?v=KYtZpAwUrVE>; Ruaim A. Muaygil, “Reexamining the Prohibition of Gestational Surrogacy in Sunni Islam,” *Developing World Bioethics* 17, no. 2 (2017), <https://doi.org/10.1111/dewb.12133>; Shamima P. Lasker and

this scholarly debate, this paper for the first time provides scientific and bioethical rationalisations to prove the main mainstream, valid concerns of religious verdicts mentioned in 1985 do not compromise genetic gestational surrogacy provisos. More to the point, this paper advocates (re)approval of genetic gestational surrogacy not only within the sphere of bigamy but also for all Islamically married couples struggling with uterine problem. Moving beyond the conventional scholarly narrative, we also discuss comparative biogenesis (genetics and nutritional) aspects of the uterus and breast milk (gestational surrogacy versus wet nursing), primarily to address the motherhood status and ethico-legal rationale within the realm of Sharia.

RESEARCH QUESTION AND AIM OF THE ARTICLE

This review article is envisioned to help repeal the Islamic proscription on genetic gestational surrogacy. To this end, it provides updated scientific evidences and analogical reasonings to prove that the mainstream criteria cited by Islamic jurists in the *fatawa* (plural of *fatwa*) are well-protected in genetic gestational surrogacy. The relevance of this article discussion is not limited to scientific evidences; rather, it extends to rationalising the concepts of motherhood, paternity and the right to bear child and protecting their social rights from the negative effects of contemporary surrogacy within the ambit of *Maqasid al-Shari'ah*. Furthermore, this paper argues the contemporary surrogacy guidelines drafted by the illusorily secular Western world and suggests guidelines in the light of Islam, Sharia and its bioethical views.

ISLAMICALLY CONSCIENTIOUS BENCHMARKS FOR PROHIBITING GENETIC GESTATIONAL SURROGACY IN SUNNI ISLAM

The notion of surrogacy is not mentioned in the primary (the Qur'ān or *sunna*²¹) or secondary sources of Sharia (based on "*istihsan*"²²). So, the only alternative left for religious scholars is to decide via common intellectual reasoning (*ijtihad*) in view of necessity, public interest and on the principle of "no harm."²³ Eminent Islamic scholars from different religious bodies often meet (Dar El-Iftaa, Cairo, in 1980; Islamic Fiqh Council, Makkah, in 1984 and 1986; the Islamic Organization for Medical Sciences, Kuwait in 1991; Qatar University in 1993;²⁴ the Islamic Education, Science, and Culture Organization, Rabaat in 2002²⁵ and the United Arab Emirates in 2002; and the International Islamic Centre for Population Studies and

Marcello Ghilardi, "Genetic Gestational Surrogacy: Hope for Muslims," *Bangladesh Journal of Bioethics* 8, no. 3 (2017), <https://doi.org/10.3329/bioethics.v8i3.35680>.

²¹ The saying and actions of Prophet Muhammed (pbuh) collected and organised by his Companions.

²² This term means "to consider something good." It is frequently used by Muslim scholars for juristic discretion.

²³ Dariusch Atighetchi, "Problems of Islamic Bioethics and Biolaw," *Derecho y Religion* 2 (2007).

²⁴ Islamic Organization of Education, Science and Culture (ISESCO), *Ethical Reflection of Advanced Genetic Research* (Doha, Qatar: ISESCO, 1993).

²⁵ Gamal I. Serour, *Embryo Research: Ethical Implications in the Islamic World* (Rabat, Morocco: ISESCO, 2002).

Research, Al-Azhar University in 2000) to discuss the appropriateness of advanced reproductive technologies and their implications from Sunni Islamic perspectives. In consonance, scholars weigh up the opinion of biomedical scientific experts of that time before formulating the guidelines and issuing a religious verdict (*fatwa*). Considering everything, eminent jurists unanimously deemed third-party assisted reproduction incompatible with Islamic teachings/bioethics and issued a landmark religious verdict (*fatwa*) in 1980²⁶ pertinent to a few important criteria mentioned in the primary source (marriage/procreation/family structure) and *Maqasid al-Shari'ah*, i.e protection of the religion (*hifz-al-din*), protection of progeny (*hifz-al-nasl*), protection of life (*hifz-al-nafs*) and protection of the mind (*hifz-al-aql*). Essentially, this *fatwa* was welcomed by both sects of Muslim (Sunni and Shi'ah) and unconditionally followed. In 1984, these scholars reassessed their blanket *fatwa* issued in 1980 against third-party assisted reproduction and conditionally permitted genetic gestational surrogacy. However, they soon retracted this acquiescence in 1985. Several decisive factors were mentioned during the deliberation *fatwa* of 1985 for the prohibition of assisted reproduction regarding genetic gestational surrogacy:

1. Confusion over real parentage status
2. Protection of lineage (*hifz al nasab*)
3. The social and ethical rights of the people involved in surrogacy (child, surrogate women and intended parents)
4. Analogy to adultery

Until 1999, both sects (Sunni and Shi'ah) followed the *fatwa* issued in 1980 by Al-Azhar University, including the 1985 deliberation; however, in 1999, there was a shift in the Shi'ah scholars' stance on both *fatawa* (their argument is discussed below in detail). Subsequently, intellectuals and academicians called for a review of the proscription on genetic gestational surrogacy within a valid marriage contract in conjunction current scientific knowledge. Before moving into scientific and bioethical rationalisations on the above criteria opting for the genetic gestational surrogacy prohibition, we will first discuss the Islamic perception of parenthood, how religious jurists determine genetic and social bonds in genetic gestational surrogacy arrangements and why few scholars/intellectuals are now advocating to repeal the proscription.

A FEW REQUISITES FOR THE ISLAMIC PERCEPTION OF PARENTHOOD

The Islamic perception of claiming parenthood is different for the mother and father when compared to contemporary perceptions where parenthood is based on social customs, morals, philosophical and religious ideals, which vary across countries and societies. In Islam, the

²⁶ Gamal I. Serour and A. R. Omran, *Ethical Guidelines for Human Reproduction Research in the Muslim Worlds* (Cairo: The International Islamic Centre for Population Studies and Research, 1992); Gamal I. Serour, *Ethical Implications of the use of ART in the Muslim World* (Cairo: The International Islamic Center for Population Studies and Research, 1997); Gamal I. Serour, *Ethical Implications of the use of ART in the Muslim World: Update* (Cairo: The International Islamic Centre for Population Studies and Research, 2000).

concept of fatherhood/patrilineal connection (*nasab*) is solely based on genetic elements and granting legal status, only if the child born is out of a valid marriage contract (*al walad li'l firash*).²⁷ In the case of ambiguity, it is dictum to verify the father's status using methods like a declaration by him that child born is his, physiognomy and witness testimony of a valid marriage relationship. The mother's stance is typically conceptualised via any of three functions:

1. Real mother: A single woman who holistically contributes in procreation (biological and gestational)²⁸ and nurturing the child.²⁹
2. Foster mother: Any woman who breastfeeds the child for a maximum of two years (paid/unpaid) is enjoined the status of mother, albeit in restricted frame of Sharia.³⁰
3. Stepmother: A woman without any biological or nurturing contributions but still enjoys motherhood status in a restricted frame of Sharia.³¹

This concept of mothers is in consonance with intellectual reasoning and analogical inferences (*ibarah al nas*) drawn from Islamic scriptures,³² laterally coordinating with the traditional, cultural and medical technological capacities and aspects of that time. As expected, there was no mind's eye of understanding or inferencing the Qur'ānic verses beyond two subdivisions (real and foster mother) or viewing motherhood in more than two sub-division by segregating into biological+gestational+breastfeeding, biological+gestational or only gestational. Beyond this frame, present scientific erudition has not only tagged motherhood differently but articulates reproduction and coitus as unconnected processes. In fact, it challenges how to look at the entire discourse and in which frame: religious or contemporary, while answering to satisfy the mainstream valid criteria of jurists; the protection of lineage; the protection of progeny; and determination of the "real mother" status. Technically, the above narrative is valid given it is normal.

The Qur'ān speaks about the same topic in a different tone or way in accordance with the circumstances³³ surrounding the verse "none are their mother except those who gave birth."³⁴ Sunni Islamic jurists consider this benchmark for the motherhood normative was in truth revealed to confute *zihar*³⁵ rather than to determine "real mother," which is beautifully discussed in detail in surah 7:189. Still, the jurists and other allied scholars are of opinion that, as per the ruling of considering the apparent meaning of the verse, it empowers surrogate women as a "real mother," if allowed. However, opponents of proscription argue that the Qur'ān clearly verbalises essential criteria to be eligible for "real mother." In point of fact, the Qur'ān explicitly grants specific motherly rights to foster mothers equivalent to their

²⁷ Muhammad al-Bukhari, *Sahih al-Bukhari*, trans. M. Muhsin Khan, *hadīth* no. 6431, <https://sunnah.com/bukhari/>.

²⁸ Qur'ān 7:189, 23:3-14, 76:2.

²⁹ Qur'ān 76:2, 46:15.

³⁰ Qur'ān 2:23.

³¹ Qur'ān 2:23.

³² Qur'ān 58:2, 46:15, 31:14, 16:72.

³³ Javed A. Ghamidi, *Islam: A Comprehensive Introduction*, 5th ed. (Pakistan: Al-Mawrid, 2012), 43.

³⁴ Qur'ān 58:2.

³⁵ Traditionally, Arabs call their wives "mother" during family quarrels.

contributions; limited rights consistent with their limited contribution.³⁶ Adding to this notion, Ruaim Muaygil contests a quagmire arises because jurists apply the principle of *ibarah al nas* on Qur’ānic verses 58:2 and 23:5-6 rather than comprehensively inferencing their meaning.³⁷ Forging ahead, Lasker and Ghilardi debate that genetic and gestational “mother” does not fit completely into the holistic criteria (discussed in the Qur’ān) normative for “real mother” (see Table 1) and propose a way out through authorising the genetic contributor (intended parent) as the “real mother.”³⁸ Both arguments seem logical because in the latter case lineage (*nasab*) is known and the rearing responsibility is on the intended parent. So, it is time to (re)ponder these verses within the realms of the purpose of revelation rather than extrapolating its apparent meaning to determine motherhood status or refute surrogacy in Islam specially when the Qur’ān is explaining procreation in different styles (see Table 1). For example:

1. Verse 76:2 states “verily we created man from a drop of mingled sperm/mixing of gamete.” Does this simply mean that gamete providers are the real parents?
2. Three other verses point out more than one criterion to entitle “real mother” status:

It is He Who created you from a single person, and made his mate of like nature, in order that he might dwell with her (in love). When they are united, she bears a light burden and carries it about (unnoticed). When she grows heavy, they both pray to Allah their Lord, (saying): “If Thou givest us a goodly child, we vow we shall (ever) be grateful.”³⁹ [Biological and gestational contributions are discussed.]

“His mother carried him with hardship and gave birth to him with hardship, and his gestation and weaning period is thirty months.”⁴⁰ [Gestational and breastfeeding contributions are discussed while genetic component is concealed.]

“None are their mother except those who gave birth to them.”⁴¹ [Gestational component is apparently highlighted while the genetic component is concealed.]

So, does the apparent meaning of these Qur’ānic verses personify a “real mother” or typify the possible subdivisions of the mother protagonist (see Table 1)? In the backdrop of these arguments, it is imperative to first redefine maternal connections and re-interpret the concepts of motherhood in tune with modern scientific advancements and intellectual capacity to legitimise the treatments new technologies are offering to infertile couple and determine “who is the real mother.” However, before doing so, jurists first need to centre primacy on the biogenesis role (nutritional and nurturing) or genetic connection of mother. The genetic connection appears central to determine the mother’s legal status and issue of the child’s inheritance, while the biogenesis connection is obligatory to determine kinship and family relations unlawful for marriages (*tahrim*). By the same token, it is also worth questioning:

³⁶ Qur’ān 2:23.

³⁷ Muaygil, “Reexamining the Prohibition.”

³⁸ Lasker and Ghilardi, “Genetic Gestational Surrogacy.”

³⁹ Qur’ān 7:189.

⁴⁰ Qur’ān 46:15.

⁴¹ Qur’ān 58:2.

1. Can a surrogate woman, by giving birth, equate herself in sanctity with the real mother who otherwise holistically contributes in the procreation? Obviously not, as she is not fulfilling all the criteria assigned for a “real mother.”
2. Can a surrogate woman, by giving birth, equate herself in sanctity with women who foster (wet nurse) a child, bearing in mind that both are doing societal services and playing a biogenesis role? If yes, can she be given the status of mother by analogy (*qiyas*) with wet nurse and consensus (*ijma*)/public welfare (*maslaha*) as Allah has granted other family members like stepmother and grandmother (maternal and paternal) the status of motherhood in a limited frame.
3. Can a woman who is providing ova (from intended married couples only) and taking the nurturing responsibility of a child be considered the “real mother,” given this will resolve the issue of protection of lineage and inheritance.

A logical answer to all these questions is, since the surrogate woman and genetic mother do not precisely fit into the definition of motherhood discussed in the Qur’ān,⁴² see Table 2, by considering verse 76:2 along with *Maqasid al-Shari’ah*, the genetic mother can be prioritised over the gestational mother since it resolves the issue of lineage and nurturing responsibility for the child. In addition, it bears in mind that the Qur’ān proclaims Islam is a religion of ease (*yusr*) rather than a religion of hardship (*usr*).⁴³

Table 1: Qur’ānic verses with their implied meaning to deduce motherhood essentials alongside their classical and contemporary understandings

S. no	Verse	Classical understanding/ implied meaning	Contemporary discourse	Mainstay point of contemporary discourse
1	Verily we created man from a drop of mingled sperm/mixing of gamete (76:2).	Real parent	Real parent	Only the biological component is discussed.
2	None are their mother except those who gave birth to them (58:2).	Real mother	Gestational mother	The gestational component is highlighted while the biological component is concealed as per the intended meaning of the verse.
3	His mother carried him with hardship and gave birth to him with hardship, and his gestation and weaning period is thirty months (46:15).	Real mother	Real mother	The term <i>biwaalidaihi</i> (father and mother) is used, which indicates husband and wife. Despite the fact gestational and breastfeeding components are highlighted, by considering the whole verse, it is taken as real mother.
4.	It is He Who created you from a single person, and made his mate of like nature, in order that he might dwell with her (in love). When they	Real mother	Real mother	Biological and gestational components are highlighted.

⁴² Qur’ān 7:189, 76:2.

⁴³ Qur’ān 94:5.

S. no	Verse	Classical understanding/ implied meaning	Contemporary discourse	Mainstay point of contemporary discourse
	are united, she bears a light burden and carries it about (unnoticed). When she grows heavy, they both pray to Allah their Lord, (saying): "If Thou givest us a goodly child, we vow we shall (ever) be grateful." (7:189)			
5.	Forbidden to you are your milk-mothers, your milk-sisters (4:23)	Foster mother	Foster mother	Breastfeeding aspect is discussed (milk kinship).
6.	Forbidden to you are your mothers, your daughters ,your sisters, your father’s sisters and your mother’s sisters, your brother’s daughters and your sister’s daughters, your milk-mothers, your milk-sisters, the mothers of your wives, and the stepdaughters - who are your foster-children, born of your wives with whom you have consummated the marriage; but if you have not consummated the marriage with them, there will be no blame upon you (if you marry their daughters) (4:23).	Stepmother	Stepmother	Social bonds are described.

Table 2: Key aspects discussed in the Qur’ān to determine the mother status

Criteria	Real mother	Milk mother	Surrogate mother	Biological mother (intended mother)
Having a valid marriage contract	Mandatory	Not required	Not required	Mandatory
Conceiving pregnancy	Mandatory	Not required	Not required	Not required
Gestating pregnancy	Mandatory	Not required	Mandatory	Not required
Breastfeeding	Not compulsory (optional)	Mandatory	Not compulsory (optional)	Not required
Nurturing	Mandatory	Not compulsory	Not compulsory	Mandatory

SCHOLARLY ARGUMENTS ON GENETIC GESTATIONAL SURROGACY PROHIBITION

Muslim religious verdicts regarding third party involvement in the form of gamete donor or uterus have been rightly and unquestionably accepted in the Muslim world⁴⁴ and advocated by scholars.⁴⁵ However, concurrent with scientific knowledge expansion and technological

⁴⁴ Marcia C. Inhorn, *Local Babies, Global Science: Gender, Religion, and In Vitro Fertilization in Egypt* (New York: Routledge, 2003), <https://doi.org/10.4324/9780203446195>.

⁴⁵ Aref Abu-rabia, "Infertility and Surrogacy in Islamic Society: Socio-Cultural, Psychological, Ethical, and Religious Dilemmas," *The Open Psychiatry Journal* 6 (2013): n65, <https://doi.org/10.2174/1874350101306010054>; Tawfique Al-Mubarak, "Surrogacy and Islam: Between Permissibility and Prohibition," *Islam and Civilisational Renewal* 5 (2014).

availability, several studies are now documenting disparities in abiding religious mandates; a sizeable number of married couple now suffer from conception problems and contemporary intellectuals are advocating to revisit the religious verdict of 1985 to help fulfil their longing for childbearing. Studies report that most Muslim infertile couples fly across borders to fulfil their reproductive choices that are otherwise prohibited in their society or countries; although no statistical data is provided to support this argument, it still reflects a distress in the community at large.⁴⁶ Gamal Serour reasons that the introduction of Intracytoplasmic Sperm Injection (ICSI) therapy played a significant role in changing the attitudes of many infertile couples, specially males, towards seeking assisted reproduction. Apart from the sense of availability of treatment, it is the change in the husband's approach from a sense of feeling shame and secrecy towards openly accepting the condition and encouraging their wives to undergo treatment. Serour concludes that ICSI, in fact, has spurred a longing for childbearing.⁴⁷

By the same token, Maria Inhorn et al. report the status quo of Muslim infertile married couples in the multi-sectarian settings of Lebanon versus the Sunni dominant Turkey and Saudi Arabia. The study highlights the emergence of Lebanon as an alluring alternative to embody the longing of Shi'ah and Sunni Muslims; in fact, Sunni Muslims are abiding by Shi'ah Muslim 'permissions' and self-justifying apprehensions by solacing their inner being that an infertile woman who conceives through ova donation is rightly entitled for "mother" status as she is gestating and breastfeeding the child.⁴⁸ Such cross-border assisted reproduction practices are also reported by Morgan Clarke in Lebanon.⁴⁹ Inhorn, in another study, documents that infertile patients from Kuwait, Saudi Arabia and Turkey visit Tehran in a quest for gamete donors.⁵⁰ To regulate the pace of change on transnational reproductive tourism, Turkey has had to impose restrictions on its citizen travelling abroad to seek donor technologies. Collectively, this scenario reflects two serious concerns:

1. The distress of Sunni Muslim infertile couples to save their marriages and have children.⁵¹

⁴⁶ Zeynep Gürtin, "Banning Reproductive Travel? Turkey's ART Legislation and Third-party Assisted Reproduction," *Reproduction BioMed Online* 23, no. 5 (2011); Marcia C. Inhorn and Soraya Tremayne, *Islam and Assisted Reproductive Technologies: Sunni and Shi'ah Perspectives* (New York: Berghahn, 2012), eBook edition, <https://doi.org/10.3167/9780857454904>.

⁴⁷ Serour, *Ethical Implications of the use of ART*.

⁴⁸ Marcia C. Inhorn et al., "Assisted Reproduction and Middle-East Kinship: A Regional and Religious Comparison," *Reproduction Biomedicine Society Online* 8 (2017), <https://doi.org/10.1016/j.rbms.2017.06.003>.

⁴⁹ Morgan Clarke, "Shiite Perspectives on Kinship and New Reproductive Technologies," *ISIM Review* 17 (2006).

⁵⁰ Marcia C. Inhorn, "Making Muslim Babies: IVF and Gamete Donation in Sunni Versus Shi'a Islam," *Culture Medicine Psychiatry* 30 (2006), <https://doi.org/10.1007/s11013-006-9027-x>.

⁵¹ Fatima A. Husain, "Reproductive Issues from the Islamic Perspective," *Human Fertility* 3, no. 2 (2000), <https://doi.org/10.1080/1464727002000198831>.

2. The Sunni Muslim religious ban on third-party assisted reproduction across the world is slowly losing power, with many infertile couples (re)considering and justifying their moral and religious stances in light of scientific knowledge and Shiite permissions.⁵²

Religious authorities need to assess this fuelling dissension creeping among Sunni Muslim society and consider (re)approving uterine services (genetic gestational surrogacy) for married couples essentially to restrain Sunni Muslims from availing third-party assisted ova donor services, given the latter is analogically considered equivalent to adultery. To potentially discourage gamete donation outside wedlock, Farid and Schotsmans suggest that religious scholars can mandate that such children will inherit from their gamete donors so there will be no violation of the Islamic law of inheritance plus it discourages potential donors because of the fear of sharing inheritance. The authors argue in support of permitting uterine services within polygamous families by stating it sufficiently resolves the concerns of religious scholars regarding protection of lineage and the possibility of incest as all parties are involved in the procreation of the child are within a marital contract.⁵³ Concurrent with these comments, another faction of scholars is providing analogical and scientific clarifications to all benchmarks liable for religious rulings. They argue first on analogical societal services and the rearing role of surrogate women versus wet nurses; the latter is highly encouraged in Islam to the extent that it is not only permitted outside wedlock but has distinct social, ethical and legal guidelines. Muaygil and Lasker argue in favour of genetic gestational surrogacy given that Islam, when no religiously legitimate ruling is present, permits what is otherwise forbidden, solely on the principle of necessity and public benefit (*maslaha*), for example porcine biosynthetic heart valve⁵⁴ or uterine transplantation⁵⁵ (Saudi Arabia in 2000 and Turkey in 2011, respectively). In truth, gestational surrogacy defender ally Egyptian Sheikh Abdel Rahman Al Adawy, Head of the Council Jurisprudence Research Committee in 2004, raises deep concerns over the legitimacy of uterine transplantation considering “who will be the mother of the child” – the uterus donor or recipient.⁵⁶ Logically, if this uterus transplantation legitimacy scenario is juxtaposed against a genetic gestational surrogacy stance, then uterus transplantation is a replica of genetic gestational surrogacy where the mainstream concern of “None are their mother except those who gave birth” appears again. We agree with the opinion of Lasker and Ghilardi that the term “*waladanahum*” refers to the entire process of childbirth – from conception to delivery – and not just the act of delivery, which religious scholars deem to decide the “real mother” between the surrogate woman and intended parent.

⁵² Marcia C. Inhorn, “Cosmopolitan Conceptions in Global Dubai? The Emiratization of IVF and its Consequences,” *Reproductive Biomedicine & Society Online* 2 (2016), <https://doi.org/10.1016/j.rbms.2016.04.004>.

⁵³ Mohammed S. Farid and Paul Schotsmans, “Gamete Donation: Ethical Divergences in Islamic Religious Thinking,” *Asian Bioethics Review* 16, no. 1 (2014), <https://doi.org/10.1353/ASB.2014.0005>.

⁵⁴ Rizwan A. Manji et al., “Porcine Bioprosthetic Heart Valves: The Next Generation,” *American Heart Journal* 164, no. 2 (2012), <https://doi.org/10.1016/j.ahj.2012.05.011>.

⁵⁵ Amel Alghrani, “Womb Transplantation and the Interplay of Islam and the West,” *Journal Religion and Science* 48, no. 3 (2013), <https://doi.org/10.1111/zygo.12037>.

⁵⁶ Dariusch Atighetchi, “The Development of Organ Transplants,” in *Islamic Bioethics: Problems and Perspectives* (Springer, 2007), <http://eknygos.lsmuni.lt/springer/237/161-197.pdf>.

In fact, scholars refer to the unmitigated statement of Prophet Muhammed (pbuh) that “whatever is rendered prohibited by descent (*nasab*) is likewise prohibited by breastfeeding,”⁵⁷ which attests that Islam equates blood relationship with milk kinship pertaining to marriage, respect towards the milk mother or kin and the reward she receives in the hereafter.⁵⁸ Second, the scholars provide scientific evidence that satisfactorily answers the major concerns of Sunni religious scholars regarding mixing of genes or DNA⁵⁹ and confute the most commonly held societal belief that foetal and maternal blood mixes. Third, they reason the concept of surrogacy is a recent *modus operandi*; therefore, this subdivision of motherhood is beyond what was envisioned by traditional or religious philosophy and this standpoint significantly influences their pronouncement on supporting the approval of availing uterine services by a married couple.

With these premises in mind, this paper now provides scientific reasoning to the major criteria framed in the religious verdicts primarily to help alter or broaden the existing frame of viewing various bonds linking children, intended parents and surrogate women.

SCIENTIFIC EVIDENCE ADDRESSING THE “PROTECTION OF LINEAGE” (*HIFZ AL NASAB*) CRITERION

Islam recognises the uterus as a sacred place where a life develops in a secure and cosy environ. Several Qur’ānic verses underpin the fertilisation and developmental process of a baby alongside intensely admiring the gestational hardship and parturition a mother endures.⁶⁰ On par, Islam is concerned about the purity of lineage, maternal biological connection and the ethical and legal rights of parents and children. Thanks to science and sophisticated techniques, today we can effectively counter the mainstream concerns for proscribing uterine services for married couple:

- Purity of lineage
- Possibility of polyspermy if the surrogate mother is married
- Legal parenthood status
- The status of real mother

Regarding the first two mainstream concerns, there is enough scientific evidence that clearly explains all molecular events of fertilisation that kick off with the contact of a sperm with a secondary oocyte (ovum), fusion of their pronuclei and intermingling of their haploid chromosomes to form a new cell known as a zygote; a large diploid cell or primordium with its own genetic makeup. More so, science explicates intrauterine life, parturition and purity of

⁵⁷ Muhammad al-Bukhari, *Sahih al-Bukhari*, Book 62, vol. 7, *hadith* no. 36, https://www.sahih-bukhari.com/Pages/Bukhari_7_62.php.

⁵⁸ Qur’ān 4:23.

⁵⁹ B. R. Sharma, “Forensic Considerations of Surrogacy: An Overview,” *Journal of Clinical Forensic Medicine* 13, no. 2 (2006), <https://doi.org/10.1016/j.jcfm.2005.08.002>.

⁶⁰ Qur’ān 39:6, 3:5-6.

lineage, so the latter can be reliably validated today with high fidelity using DNA fingerprinting techniques.

A review of all scientific data suggests, despite the fact the oocyte is surrounded by millions of sperm, it is fertilised by one single sperm in a one-hit-or-miss action and, soon after the strike, the oocyte depolarises its plasma membrane to prevent polyspermy. This insemination process in the case of gestational surrogacy is carried out entirely in a highly controlled external environment where there is no chance of third person involvement or polyspermy.⁶¹ The resulting embryo or blastocyst, through genetic recombination of the intended parents' genomes, develops its own genome and establishes its gender in accordance with the "X" or "Y" chromosome it inherits from the intended father. This suffices that the embryo is genetically related to the intended parents and, when implanted in the surrogate womb, there is no chance for the surrogate mother's DNA to alter the genetic makeup of the embryo.

Another important concern given by Islamic scholars is that surrogate mother is not Islamically married to the intended father, so placing an embryo even for developmental purposes is forbidden by stigmatising it with adultery. However, it is important to understand that it is an embryo (a new entity/baby with distinct genome, shape, structure and gender), rather than semen, that is implanted and no coitus or illicit relationship occurs between the intended father or woman in question. Moreover, post-implantation, the embryo or blastocyst is protected from the external environ by distinct membranes and the growing embryo gains nourishment directly from its host via a placenta, which is a barrier or gatekeeper and provides an exclusively diffusive interchange and there is no mixing of bloodstreams.⁶² So, the possibility of mixing of DNA or the Islamic apprehension of confusion over proper lineage is proved incorrect. However, Notta et al. suggest a transient effect of the hormonal or nutritional environment in the surrogate womb that regulates the epigenome⁶³ of foetus (a baby in the early developmental stage typically from 11 weeks of gestation). For example, nutritional deficiency during pregnancy can alter the normal development of a foetus or an increase in maternal adrenalin under stress conditions can accelerate foetal heartbeat.⁶⁴ These studies corroborate the rationale behind the concern that there are physiological, emotional and psychological bonds between the surrogate woman and child. However, all these bonds hold true for a wet nurse also, so to allow one and deny the other on same footing is something that should be reviewed.

Another major concern Muslim religious jurists raise regarding genetic gestational surrogacy is the marital status of the surrogate woman, as Islam prohibits the semen of one man touching the foetus that is the product of another man's semen; however, it is well-documented scientifically/medically that, during pregnancy, the cervix is closed with a mucosal

⁶¹ Katerina Georgadaki et al., "The Molecular Basis of Fertilization," *International Journal of Molecular Medicine* 38, no. 4 (2016), <https://doi.org/10.3892/ijmm.2016.2723>.

⁶² Yuping Wang and Shuang Zhao, *Vascular Biology of the Placenta* (San Rafael, CA: Morgan & Claypool Life Science, 2010).

⁶³ Epigenetics is the branch of science that deals with effects of environment on our biological function.

⁶⁴ James P. Notta et al., "The Structure and Function of the Cervix during Pregnancy," *Translational Research in Anatomy* 2 (2016), <https://doi.org/10.1016/j.tria.2016.02.001>.

plug and an amniotic sac covers the growing foetus to protect it from the outside vaginal environ (bacteria, virus or seminal fluid).⁶⁵ Hence, there is no question of a third party's semen touching or manipulating the other man's foetus. These arguments gain emphatic support from a superfetation⁶⁶ case reported in 2017 in which it was distinctly observed that the externally created embryo using IVF from the intended parents and the naturally formed embryo are gestationally different, genetically distinct and biologically related to the respective parents as confirmed by genetic testing.⁶⁷ In fact, the superfetation case is clear-cut proof on how nature safeguards the genetic identity of two biologically distinct children in a single womb with the same blood supply and provides sufficient scientifically corroborated grounds for jurists to settle their apprehension of lineage mixing and (re)consider their decision on gestational surrogacy for married couples in light of the robust evidence (genetic testing, superfetation, epigenetics) presented above.

ANALOGICAL RELATIONSHIP BETWEEN SURROGATE WOMEN VERSUS WET NURSES

Motherhood in Islam is raised to the highest levels of spiritual achievement – pregnancy, giving birth, caring for a child and breastfeeding have been given Divine value and considered not only equivalent to an act of worship but are promised by Allah to be duly rewarded in the hereafter. Several Qur'ānic verses signify motherhood holistically by acknowledging the hardship of pregnancy, caring and breastfeeding a child:

And we have enjoined upon man, to his parent, good treatment. His mother carried him with hardship and gave birth to him with hardship and her gestation and weaning period is thirty months.⁶⁸

This Qur'ānic verse confers “real mother” status on the one who conceives, carries in pregnancy, gives birth and nurtures the child. Besides this verse, eight other verses in the Qur'ān emphasise breastfeeding as a child's birthright, either by the biological or non-biological mother (wet nurse). In fact, the Qur'ān instructs the father to arrange wages for the wet nurse if required⁶⁹ and decrees statutes to address various social and ethical issues like:

- Milk kin cannot claim any form of inheritance from milk parents
- Milk parents have no legal obligation to provide maintenance for milk children

⁶⁵ Bruce M. Carlson, *Human Embryology and Developmental Biology*, 6th ed. (USA: Elsevier, 2018), eBook edition.

⁶⁶ Superfetation is an extremely rare phenomena observed in genetic gestational surrogacy where a woman agrees to surrogate for a couple and gives birth to two babies – one is her own and the other is the intended couple's.

⁶⁷ Matthew Wright, “Surrogate Forced to Fight for Custody for her own Son after Rare Condition Caused her to Fall Pregnant with Twin – One of them is Hers,” *Daily Mail*, October 28, 2017, <https://www.dailymail.co.uk/news/article-5026195/American-surrogate-battled-Chinese-couple-custody.html>; Christos Spyroulis et al., “Superfetation: A Surrogate Dilemma,” *Journal Case Report Images Obstetrics Gynecology* 7 (2021).

⁶⁸ Qur'ān 46:15.

⁶⁹ Qur'ān 2:233.

- Milk parents are not the milk children's guardians unless specified by the biological parents
- A child cannot marry their milk mother or her husband
- A child cannot marry their milk siblings, including grandchildren
- A child cannot marry the mother/father of their milk mother
- A child cannot marry the granddaughter of their milk mother or her husband

However, despite conferring *tahrim* status with the entire family, a wet nurse is not considered a "real mother." This provides grounds for scholars to argue in favour of surrogate women to be considered a mother albeit in a limited frame as she also provides nourishment and care to the developing child⁷⁰ without interfering in its genetic fidelity.

SCIENTIFIC EVIDENCE SUPPORTING THE NURTURING AND NOURISHING ANALOGY OF SURROGATE WOMEN AND WET NURSES

There is a Greek and Arab medieval medical antiquity where breast milk is often considered equivalent to blood in a mother's uterus apart from the source of moral values and vigour for the developing child.⁷¹ On the other hand, three major criteria, according to Islamic jurisprudence, inevitably require to establish *tahrim* status in milk kinship:

1. Breastfeeding in five sittings, each of which should be separate from the other
2. Breastfeeding must be within the first two years or until weaning
3. The child should receive milk sufficient to reach the stomach and help build flesh and bone

Besides these three reasons, the Qur'ān and *sunna* do not elaborate much about the rationale behind establishing *tahrim* status, leaving it open for research, reinterpretation and correlation with the best available evidence juxtaposed to the established principled knowledge of Islamic Sharia.

Current scientific research on the composition of breast milk and its impact on a developing child clearly explicates why Islam establishes *tahrim* status on breastfeeding. Breast milk, apart from providing nutritional support, transports a sizeable amount of white blood cells, stem cells, growth factors, immunological factors, exosomes and microRNA from woman to baby, which obviously modulates the expression of various genes by triggering genome-wide epigenetic modification⁷² involving hypomethylation of the child's DNA,⁷³ negative regulation

⁷⁰ Laetitia Niers et al., "Nutritional Support for the Infant's Immune System," *Nutrition Review* 65, no. 8 pt 1 (2007), <https://doi.org/10.1301/nr.2007.aug.347-360>.

⁷¹ Avner Giladi, "Breast-Feeding in Medieval Islamic Thought: A Preliminary Study of Legal and Medical Writings," *Journal of Family History* 23, no. 2 (1998), <https://doi.org/10.1177/036319909802300201>; Afif El-Khuffash and Sharon Unger, "The Concept of Milk Kinship in Islam: Issues raised when offering Preterm Infants of Muslim Families Donor Human Milk," *Journal Human Lactation* 28, no. 2 (2012), <https://doi.org/10.1177/0890334411434803>.

⁷² Hasan Ozkan et al., "Milk Kinship Hypothesis in Light of Epigenetic Knowledge," *Clinical Epigenetics* 4 (2012), <https://doi.org/10.1186/1868-7083-4-14>.

⁷³ Lucia Daxinger and Emma Whitelaw, "Transgenerational Epigenetic Inheritance: More Questions than Answers," *Genome Research* 20, no. 12 (2010), eBook edition, <https://doi.org/10.1101/gr.106138.110>;

of gene transcription and histone deacetylases activity.⁷⁴ Concurrently, these changes liaise to sequester the whole gene expression profile towards influencing the physiological function of cells,⁷⁵ although most of the epigenetic changes are known to be cleared in each generation but transgenerational epigenetic inheritance at least up to three generations is already documented, thus espouse the possible emergence of novel epigenotypes.⁷⁶ So, if woman breastfeeds a child alongside wet nursing a child, it is anticipated all three will shares the same cellular components; more specifically, the same epigenotype. Hence, these biological situations rationalise the Islamic stance of establishing *tahrim* status between milk siblings or within milk kinship. So, it justifies the prohibition of marriages between milk siblings as it can heighten the risk of congenital malformation or autosomal recessive diseases in the next generation akin to consanguineous marriages.

Moreover, breast milk transfers a high proportion of maternal DNA in the form of stem cells and white blood cells, which supports the notion that the biological DNA of the wet nurse cannot interfere with the genotype of the child predetermined at the time of conception, barring physiological, epigenetics, psychological and emotional mystique. This evidence-based research also substantiates the Islamic philosophy of selecting a pious wet nurse as she not only supports physiological strength but also determines the child's spiritual, psychological and emotional characteristics. Moreover, it is worth mentioning why Islam restricts the breastfeeding timeline to two years or less and at least five episodes of suckling for establishing *tahrim* status. Leroux et al. and Sato et al. report that, during the early developmental period, the human body exhibits greater plasticity in adapting to epigenetic programming and acquiring maternal DNA. Given this, it is rational to draw analogical similarities between surrogacy and wet nursing (blood versus breast milk composition) and their impact on child development because a surrogate womb serves in a similar capacity of providing nutrition as the wet nurse without altering the traits or gender of the conceptus determined at the time of fertilisation but may influence the epigenetic programming depending on the environ, nutritional status and spiritual practices. Therefore, akin to the wet nurse, a surrogate mother solely shares epigenotypes along with physiological, behavioural and emotional characteristics. Table 3 depicts key aspects of similarities as well as departure points between wet nursing and gestational surrogacy.

Table 3: Key attributes between gestational surrogacy and wet nursing

S. no	Gestational surrogacy	Wet nursing/weaning
1.	Does not alter the genetic makeup of the foetus	Does not alter the genetic makeup of the baby

Bodo C. Melnik and Gerd Schmitz, "Milk's Role as an Epigenetic Regulator in Health and Disease," *Diseases* 5, no. 1 (2017), <https://doi.org/10.3390/diseases5010012>.

⁷⁴ Changchun Xiao, and Klaus Rajewsky, "MicroRNA Control in the Immune System: Basic Principle," *Cell* 136, no. 1 (2009), <https://doi.org/10.1016/j.cell.2008.12.027>.

⁷⁵ Christine Leroux, Mathilde Lea Cherve and J. Bruce German, "Perspective: Milk MicroRNAs as Important Players in Infant Physiology and Development," *Advances in Nutrition* 12, no. 5 (2021), <https://doi.org/10.1093/advances/nmab059>.

⁷⁶ Fumiaki Sato et al., "MicroRNAs and Epigenetics," *The FEBS Journal* 278, no. 10 (2011), <https://doi.org/10.1111/j.1742-4658.2011.08089.x>.

S. no	Gestational surrogacy	Wet nursing/weaning
2.	Micro chimerism is documented	Micro chimerism is reported
3.	Emotional and biological bonds are present between the surrogate mother and developing foetus	Emotional and biological bonds are present between the foster mother and child
4.	No textual evidence is present in the Qur'ān and <i>sunna</i>	Textual evidence is present in the Qur'ān
5.	No defined laws are present	Well-established Islamic laws are present regarding milk-kinship
6.	The surrogate mother provides nutritional, psychological and emotional support to the developing foetus	The milk mother provides nutritional, psychological and emotional support to the child
7.	Up to 40 weeks of pregnancy	Islamically, weaning is up to two years
8.	Epigenetic programming of gene expression is reported	Epigenetic programming of gene expression is reported
9.	Monetary compensation depends on mutual understanding	Monetary compensation depends on mutual understanding
10.	Monetary compensation will be paid by the legal contractee	Islamically, the father is responsible for the monetary compensation
11.	Contemporary surrogacy is commercial and altruistic	Wet nursing in Islam is not business driven; rather, it is philanthropic or suitably compensated with mutual understanding

INTENDED ISLAMIC PERSPECTIVES ON LEGAL AND ETHICAL ISSUES OF GESTATIONAL SURROGACY

A fleeting look at surrogacy offers an alluring alternative for an infertile couple to have a biologically related child; however, due to a lack of proper legislation, the intended parents and surrogate women are often emotionally and commercially exploited by so-called surrogacy agents. In addition, it dishonours the concept of motherhood by earmarking the parties as gestational, genetic, legal and intended. On the other hand, the destiny of the resultant child is even worse as cross-border surrogacy lands them in various legal and ethical trenches related to citizenship, parentage and child rights, and so on.⁷⁷ It is further noticed that the surrogate child can be stigmatised as an illegal product, given that surrogacy is illegal in many countries across the world or even in Sunni Islam. All these factors kick off fierce debate about the legal, moral, social and religious permissibility of surrogacy throughout the world primarily to protect their legal rights and provide social security. In that regard, detailed guidelines were eventually developed (surrogate mother, intended parent and child born) by different countries to safeguard their rights.⁷⁸ However, their utilitarian approach was a stumbling block in the failure

⁷⁷ Martha Field, "Reproductive Technologies and Surrogacy: Legal Issues," *Creighton Law Review* 25, no. 5 (1992); Simo Zaami, "Assisted Heterologous Fertilization and the Right of Donor Conceived Children to know their Biological Origins," *Clinical Therapeutics* 169, no. 1 (2018), <https://doi.org/10.7417/T.2018.2052>.

⁷⁸ Countries like UK, Canada, Georgia, Ukraine, India, Colombia, Laos and USA allow surrogacy and have developed legislation. A discussion of every country's bylaws for surrogacy is beyond the scope of this article, but one example is *Surrogacy Arrangements Act 1985* (UK), <https://www.legislation.gov.uk/ukpga/1985/49>.

of these guidelines, creating several emotional, psychological and economic issues.⁷⁹ For these reasons, it is imperative to (re)look at the whole discourse surrounding prohibition on availing uterine services in the form of genetic gestational surrogacy and framing Islam-inspired guidelines for better protecting the dignity and self-esteem of surrogating women and the rights and wellbeing of the child born. Thus, given the exigency, a probable blueprint for an Islamic approach towards the acceptability of gestational surrogacy for married couples is discussed in Table 4, considering the Islamic laws surrounding wet nursing, the concept of motherhood and inheritance laws.

Table 4: Bioethical outlook of Western secular world compared to the Islamic approach

S. no	Contemporary surrogacy	Islam-inspired surrogacy
1.	All types of surrogacies are in practice as long as the law of the land where surrogacy is accomplished are abided by	Only gestational surrogacy is permitted within a valid heterosexual marriage with the couple donating the gametes
2.	No legal relationship is considered between the surrogate mother and child born	Legal relationship will be established between the intended parents, surrogate mother and child born as per Sharia
3.	No act of <i>hurmat</i> is established	The child born to the surrogate mother will establish <i>hurmat</i> similar to milk mother, milk siblings and their father
4.	Legally, the surrogate mother has no social rights over the child after birth	Social bonding and rights are granted to the surrogate mother, child and intended parents
5.	Legal and ethical issues are dealt with according to the law of the land where surrogacy is established	Legal and ethical issues are dealt within the ambit of Sharia
6.	If the intended parents die, responsibility for the surrogate child lies with the state	If the intended parents die, responsibility for the child is transferred to immediate paternal family members or moves according to established Sharia law
7.	Disclosing details of the surrogate mother to the child is conditional	Disclosing details of the surrogate mother and her family member to the surrogated child will be compulsory to establish <i>hurmat</i> and for social meetings
8.	Economics of surrogacy are often exploitative in nature and solely motivated by profits	The economics of surrogacy are needs-based and effective checks and balances are embedded in the Islamic belief system
9.	The surrogate mother and her family members suffer emotionally as the baby is handed over immediately to the intended parents	The surrogate mother and her family members can meet with the baby whenever they desire

Legal issues:

- A centralised database can be generated to trace the web of surrogate mothers and surrogated children. This will help avoid incest by establishing *tahrim* status and can help

⁷⁹ Gloria Torres, Anne Shapiro and Tim K. Mackey, "A Review of Surrogate Motherhood Regulation in South American Countries: Pointing to a Need for an International Legal Framework," *BMC Pregnancy and Childbirth* 19 (2019); Rosalei Ber, "Ethical Issues in Gestational Surrogacy," *Theoretical Medicine and Bioethics* 21, no. 2 (2000), <https://doi.org/10.1023/a:1009956218800>.

coordinate child and mother social meetings to suffice emotional and psychological attachments. The possibility of incest can be resolved.

- The surrogated child will be legally linked to the biological parents and can claim all legal rights as per Sharia. This will help implement the Islamic law of inheritance.
- Surrogated children cannot claim inheritance rights from the surrogate parent, which is akin to milk kinship or an adopted child.
- Surrogate parents do not have any legal obligation to maintain surrogated children.

Ethical issues:

- Surrogate parents will not be the child's guardian unless specified by the biological parents.
- The surrogated child cannot marry their surrogate mother or with kinship established by surrogacy similar to milk kinship as per Sharia.
- Since the surrogate mother and child are physically and emotionally attached, they can meet whenever they wish to do so akin to a wet nurse.
- The surrogated child will treat and respect the surrogate mother similar to the real mother or milk mother.
- Establishing *tahrim* status with the surrogate mother and her family members will also help resolve another important ethical concern from Islamic jurists regarding unintentional marriages between brothers, sisters and close relatives.⁸⁰

Monetary agreements:

- Surrogate women are entitled to receive monetary compensation from the intended father by mutual consent akin to a wet nurse in Islam,⁸¹ primarily to cover expenses right from the first day of treatment until 40 days post-delivery. These charges will cover food, diagnostics, medicines, delivery charges, post-partum expenses, travel, board, etc., and can be decided based on the period and culture.
- The intended father and surrogate mother can sign a mutual agreement with at least two adult witnesses from each side.
- The compensation can remain effective even if the intended father dies. In that case, it will be the responsibility of the paternal grandfather or paternal uncle, or has to be taken from the inheritance left by the intended father.
- Any dispute during the agreement period can be resolved by approaching legal authorities as per the Islamic jurisprudence.

RESPONSIBILITY OF THE SURROGATED CHILD

Child welfare and safeguarding their intrinsic rights are among several reasons considered by prominent Muslim scholars for prohibiting surrogacy. In principle, Islam prioritises intrinsic

⁸⁰ Hossem E. Fadel, "The Islamic Viewpoint on New Assisted Reproductive Technologies," *Fordham Urban Law Journal* 30, no. 1 (2002).

⁸¹ Qur'ān 65:6-7.

rights of a child to be reared and nurtured over the ethical question of who is their parent and grants distinct rights and responsibilities to children and parent. These rights are mostly biologically related with the father, particularly the right to inheritance, financing education and upbringing. Biological parents are known in gestational surrogacy; therefore, the surrogated child can enjoy the same rights akin to their biological siblings. Surrogated child can inherit from both intended parents as per the inheritance rule mention in Qur'ān verse 4:11. If the father dies, responsibility for the child again can be as per Sharia rulings.

IDEAL CHARACTERISTICS OF A PROSPECTIVE ISLAMIC SURROGATE MOTHER

Identification and selection of surrogate women is of prime importance, as Prophet Muhammed (pbuh) stated that sustenance, prosperity and adversity of a child is determined in the mother's womb.⁸² Moreover, it is strongly believed that the faith, thoughts and actions of the mother impact the foetus. So, several characteristics should be considered when selecting a woman for surrogacy:

- Should be a Muslim.
- Should be sympathetic and caring.
- Should be healthy, strong and schooled with good manners.
- Should not be an addict, as Imam sadiq (as) “prohibit those who suckle your children from drinking wine.”⁸³

CONCLUSION

Genetic gestational surrogacy is now increasingly believed to be the only surrogacy arrangement that is most compatible with Islamic teachings, especially when several scientific evidences are present to convincingly address the valid concerns raised by eminent Islamic scholars. The rebuttals presented in this article are based on current scientific evidences and an analogical approach; the biogenesis and analogical parallels wet nursing and gestational surrogacy, the superfetation case and DNA fingerprinting proofs that no genetic mixing of a child's biological DNA with the surrogate woman's DNA takes place (the concern of purity of lineage is maintained), no touching of a man's semen to someone else's foetus as the cervix is completely closed and lastly no adultery (as an embryo is implanted rather than sperm).

The arguments and dimensions presented above are suggestions and in no way constitute an authoritarian ruling. On the whole, they can be considered learned opinion. The legal, social, ethical, emotional and psychological issues pertaining to the realm of surrogacy are real; however, an Islamic framework may reduce them to a reasonable degree.

⁸² al-Bukhari, *Sahih al-Bukhari*, book 59, vol. 4, *ḥadīth* no. 3208. <https://sunnah.com/bukhari:3208>.

⁸³ Mehdi, D. Firoozabadi and Mohammad A. Sheikhi, “Breastfeeding from Qur'an to Medical Science,” *International Journal of Current Research and Academic Review* 3, no. 7 (2015).

BIBLIOGRAPHY

- Abbasi-Shavazi, Mohammad Jalal, Marcia C. Inhorn, Hajjeh Bibi Razeghi-Nasrabad and Ghasem Toloo. "The Iranian ART Revolution: Infertility, Assisted Reproductive Technology, and Third-party Donation in the Islamic Republic of Iran." *Journal of Middle East Women's Studies* 4, no. 2 (2008): 1-48.
- Abu-rabia, Aref. "Infertility and Surrogacy in Islamic Society: Socio-Cultural, Psychological, Ethical, and Religious Dilemmas." *The Open Psychiatry Journal* 6 (2013): 54-60. <https://doi.org/10.2174/1874350101306010054>.
- Aflatoonian, Nastaran, Maryam Eftekhar, Behrooz Aflatoonian, Elham Rahmai and Abass Aflatoonian. "Surrogacy as a Good Option for Treatment of Repeated Implantation Failure: A Case Series." *Iranian Journal of Reproductive Medicine* 11, no. 1 (2013): 77-80.
- Al-Bar, Mohammed Ali, and Hassan Chamsi-Pasha. *Contemporary Bioethics: Islamic Perspective*. New York: Springer International, 2015. eBook edition.
- al-Bukhari, Muhammad. *Sahih al-Bukhari*. Translated by M. Muhsin Khan. <https://sunnah.com/bukhari/>.
- Alghrani, Amel. "Womb Transplantation and the Interplay of Islam and the West." *Journal Religion and Science* 48, no. 3 (2013): 618-634. <https://doi.org/10.1111/zygo.12037>.
- Al-Mubarak, Tawfique. "Surrogacy and Islam: Between Permissibility and Prohibition." *Islam and Civilisational Renewal* 5 (2014): 277-281.
- al-Qaradawi, Yusuf. *Fatawa Mu'asirah* [Contemporary Fatawa]. Beirut: al-Maktab al-Islami, 2000.
- Atighetchi, Dariusch. "The Development of Organ Transplants." In *Islamic Bioethics: Problems and Perspectives*, 161-197. Springer, 2007. <http://eknygos.lsmuni.lt/springer/237/161-197.pdf>.
- Atighetchi, Dariusch. "Problems of Islamic Bioethics and Biolaw." *Derecho y Religion* 2, (2007): 221-229.
- Ber, Rosalei. "Ethical Issues in Gestational Surrogacy." *Theoretical Medicine and Bioethics* 21, no. 2 (2000): 153-169. <https://doi.org/10.1023/a:1009956218800>.
- Brännström, Matts, Pernilla D. Kähler, Robert Greite, Johan Mölne, César Díaz-García and Stefan G. Tullius. "Uterus Transplantation: A Rapidly Expanding Field." *Transplantation* 102, no. 4 (2018): 569-577. <https://doi.org/10.1097/TP.0000000000002035>.
- Carlson, Bruce M. *Human Embryology and Developmental Biology*, 6th ed. USA: Elsevier, 2018. eBook edition.
- Clarke, Morgan. "Shiite Perspectives on Kinship and New Reproductive Technologies." *ISIM Review* 17 (2006): 26-27.

- Daxinger, Lucia, and Emma Whitelaw. "Transgenerational Epigenetic Inheritance: More Questions than Answers." *Genome Research* 20, no. 12 (2010): 1623-1628. eBook edition. <https://doi.org/10.1101/gr.106138.110>.
- El-Hak, Gad. "In Vitro Fertilization and Test Tube Baby." *Fatwa*, vol. 1225, 3213-3228. Cairo, Egypt: Dar El Iftaa, 1980.
- El-Khuffash, Afif, and Sharon Unger. "The Concept of Milk Kinship in Islam: Issues raised when offering Preterm Infants of Muslim Families Donor Human Milk." *Journal of Human Lactation* 28, no. 2 (2012): 125-128. <https://doi.org/10.1177/0890334411434803>.
- Fadel, Hossem, E. "The Islamic Viewpoint on New Assisted Reproductive Technologies." *Fordham Urban Law Journal* 30, no. 1 (2002): 147-157.
- Farid, Mohammed S., and Paul Schotsmans. "Gamete Donation: Ethical Divergences in Islamic Religious Thinking." *Asian Bioethics Review* 16, no. 1 (2014): 23-38. <https://doi.org/10.1353/ASB.2014.0005>.
- Field, Martha. "Reproductive Technologies and Surrogacy: Legal Issues." *Creighton Law Review* 25, no. 5 (1992): 1589-1598.
- Firoozabadi, Mehdi D., and Mohammad A. Sheikhi. "Breastfeeding from Qur'an to Medical Science." *International Journal of Current Research and Academic Review* 3, no. 7 (2015): 134-137.
- Georgadaki, Katerina, Nikolas Khoury, Demetrios A. Spandidos and Vasilis Zoumpourlis. "The Molecular Basis of Fertilization." *International Journal of Molecular Medicine* 38, no. 4 (2016): 979-86. <https://doi.org/10.3892/ijmm.2016.2723>.
- Ghamadi Center of Islamic Learning. "Surrogacy in Islam, Surrogate Motherhood – Javed Ahmed Ghamidi." YouTube video, 12:42, December 4, 2020. <https://www.youtube.com/watch?v=KYtZpAwUrVE>.
- Ghamidi, Javed A. *Islam: A Comprehensive Introduction*, 5th ed. Pakistan: Al-Mawrid, 2012.
- Giladi, Avner. "Breast-Feeding in Medieval Islamic Thought: A Preliminary Study of Legal and Medical Writings." *Journal of Family History* 23, no. 2 (1998): 107-123. <https://doi.org/10.1177/036319909802300201>.
- González, Noelia Igareda. "Legal and Ethical Issues in Cross-border Gestational Surrogacy." *Fertility Sterility* 113, no. 5 (2020): 916-919. <https://doi.org/10.1016/j.fertnstert.2020.03.003>.
- Goswami, Gajendra K. "The Genetic Truth of Surrogate Parentage." *Medical Legal Journal* 83, no. 4 (2015): 188-193. <https://doi.org/10.1177/0025817215576877>.
- Gürtin, Zeynep. "Banning Reproductive Travel? Turkey's ART Legislation and Third-party Assisted Reproduction." *Reproduction BioMed Online* 23, no. 5 (2011): 555-565.
- Husain, Fatima A. "Reproductive Issues from the Islamic Perspective." *Human Fertility* 3, no. 2 (2000): 124-128. <https://doi.org/10.1080/1464727002000198831>.

- Haeri, Shaela. *Law of Desire: Temporary Marriage in Shi'i Iran*. New York: Syracuse University Press, 1989.
- Inhorn, Marcia C. "Cosmopolitan conceptions in global Dubai? The Emiratization of IVF and its consequences". *Reproductive Biomedicine & Society Online* 2 (2016): 24-31. <https://doi.org/10.1016/j.rbms.2016.04.004>.
- Inhorn, Marcia C. *Local Babies, Global Science: Gender, Religion, and In Vitro Fertilization in Egypt*. New York: Routledge, 2003. <https://doi.org/10.4324/9780203446195>.
- Inhorn, Marcia C. "Making Muslim Babies: IVF and Gamete Donation in Sunni Versus Shi'a Islam." *Culture Medicine Psychiatry* 30 (2006): 427-450. <https://doi.org/10.1007/s11013-006-9027-x>.
- Inhorn, Marcia C., and Soraya Tremayne. *Islam and Assisted Reproductive Technologies: Sunni and Shi'ah Perspectives*. New York: Berghahn, 2012. eBook edition. <https://doi.org/10.3167/9780857454904>.
- Inhorn, Marcia C., and Soraya S. Tremayne. "Islam, Assisted Reproduction, and the Bioethical Aftermath." *Journal of Religion Health* 55, no. 2 (2016): 422-430. <https://doi.org/10.1007/s10943-015-0151-1>.
- Inhorn, Marcia C., Daphna Birenbaum-Carmeli, Soraya Tremayne and Zeynep Gürtin. "Assisted Reproduction and Middle East Kinship: A Regional and Religious Comparison." *Reproduction Biomedicine Society Online* 8 (2017): 41-51. <https://doi.org/10.1016/j.rbms.2017.06.003>.
- Islamic Organization of Education, Science and Culture (ISESCO). *Ethical Reflection of Advanced Genetic Research*. Doha, Qatar: ISESCO, 1993.
- Jain, Meaghan, and Manvinder Singh. *Assisted Reproductive Technology (ART) Techniques*. Treasure Island, FL: Statpearls Publishing, 2021.
- Larijani, Bagher, and Farzaneh Zahedi. "Ethical and Religious Aspects of Gamete and Embryo Donation and Legislation in Iran." *Journal of Religion and Health* 46, no. 3 (2007): 399-408.
- Lasker, Shamima P., and Marcello Ghilardi. "Genetic Gestational Surrogacy: Hope for Muslims." *Bangladesh Journal of Bioethics* 8, no. 3 (2017): 1-8. <https://doi.org/10.3329/bioethics.v8i3.35680>.
- Leroux, Christine, Mathilde Lea Cherve and J. Bruce German. "Perspective: Milk MicroRNAs as Important Players in Infant Physiology and Development." *Advances in Nutrition* 12, no. 5 (2021): 1625-1635. <https://doi.org/10.1093/advances/nmab059>.
- Manji, Rizwan A., Alan H. Menkis, Burcin Ekser and David K. C. Cooper. "Porcine Bioprosthetic Heart Valves: The Next Generation." *American Heart Journal* 164, no. 2 (2012): 177-185. <https://doi.org/10.1016/j.ahj.2012.05.011>.

- Melnik, Bodo C., and Gerd Schmitz. "Milk's Role as an Epigenetic Regulator in Health and Disease." *Diseases* 5, no. 1 (2017): art. 12. <https://doi.org/10.3390/diseases5010012>.
- Muaygil, Ruaim A. "Reexamining the Prohibition of Gestational Surrogacy in Sunni Islam." *Developing World Bioethics* 17, no. 2 (2017): 112-120. <https://doi.org/10.1111/dewb.12133>.
- Niers, Laetitia, Marianne Stasse-Wolthuis, Frans M. Rombouts and Ger T. Rijkers. "Nutritional Support for the Infant's Immune System." *Nutrition Review* 65, no. 8 pt 1 (2007): 347-360. <https://doi.org/10.1301/nr.2007.aug.347-360>.
- Notta, James P., Elizabeth A. Bonney, James D. Pickering and Nigel A. B. Simpson. "The Structure and Function of the Cervix during Pregnancy." *Translational Research in Anatomy* 2 (2016): 1-7. <https://doi.org/10.1016/j.tria.2016.02.001>.
- Ozkan, Hasan, Funda Tuzun, Abdullah Kumral and Nurray Duman. "Milk Kinship Hypothesis in Light of Epigenetic Knowledge." *Clinical Epigenetics* 4 (2012): art. 14. <https://doi.org/10.1186/1868-7083-4-14>.
- Padela, Aasim I., Katherine Klima and Rosie Duivenbode. "Producing Parenthood: Islamic Bioethical Perspectives & Normative Implications." *New Bioethics* 26, no. 1 (2020): 17-37. <https://doi.org/10.1080/20502877.2020.1729575>.
- Sato, Fumiaki, Soken Tsuchiya, Stephen J. Meltzer and Kazuharu Shimizu. "MicroRNAs and Epigenetics." *The FEBS Journal* 278, no. 10 (2011): 1598-1609. <https://doi.org/10.1111/j.1742-4658.2011.08089.x>.
- Serour, Gamal I. *Embryo Research: Ethical Implications in the Islamic World*. Rabat, Morocco: ISESCO, 2002.
- Serour, Gamal I, and A. R. Omran. *Ethical Guidelines for Human Reproduction Research in the Muslim Worlds*. Cairo: The International Islamic Centre for Population Studies and Research, 1992.
- Serour, Gamal I. *Ethical Implications of the use of ART in the Muslim World*. Cairo: The International Islamic Centre for Population Studies and Research, 1997.
- Serour, Gamal I. *Ethical Implications of the use of ART in the Muslim World: Update*. Cairo: The International Islamic Centre for Population Studies and Research, 2000.
- Serour, Gamal I., Mohamed A. Aboulghar and Raaga T. Mansour. "Bioethics in Medically Assisted Conception in the Muslim World." *Journal of Assisted Reproduction and Genetics* 12, no. 9 (1995): 559-565. <https://doi.org/10.1007/BF02212574>.
- Sharma, B. R. "Forensic Considerations of Surrogacy: An Overview." *Journal of Clinical Forensic Medicine* 13, no. 2 (2006): 80-85. <https://doi.org/10.1016/j.jcfm.2005.08.002>.
- Spyroulis, Christos, Khadeeja Naqvi, Marco Gaudoin and Al-Inizi Shamma. "Superfetation: A Surrogate Dilemma." *Journal Case Report Images Obstetrics Gynecology* 7 (2021): art. 100075Z08CS2021.

- Taylor, Bridget. "Whose Baby is it? The Impact of Reproductive Technologies on Kinship." *Human Fertility Cambridge England* 8, no. 3 (2005): 189-195. <https://doi.org/10.1080/14647270500277693>.
- Torres, Gloria, Anne Shapiro and Tim K. Mackey. "A Review of Surrogate Motherhood Regulation in South American Countries: Pointing to a Need for an International Legal Framework." *BMC Pregnancy and Childbirth* 19 (2019): art. 46.
- Wang, Yuping, and Shuang Zhao. *Vascular Biology of the Placenta*. San Rafael, CA: Morgan & Claypool Life Science, 2010.
- Wright, Matthew. "Surrogate Forced to Fight for Custody for her own Son after Rare Condition Caused her to Fall Pregnant with Twin – One of them is Hers," *Daily Mail*, October 28, 2017, <https://www.dailymail.co.uk/news/article-5026195/American-surrogate-battled-Chinese-couple-custody.html>.
- Xiao, Changchun, and Klaus Rajewsky. "MicroRNA Control in the Immune System: Basic Principle." *Cell* 136, no. 1 (2009): 26-36. <https://doi.org/10.1016/j.cell.2008.12.027>.
- Zaami, Simo. "Assisted Heterologous Fertilization and the Right of Donor Conceived Children to know their Biological Origins." *Clinical Therapeutics* 169, no. 1 (2018): e39-e43. <https://doi.org/10.7417/T.2018.2052>.