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Beyond Permissibility: Human Dignity and Intergenerational Justice in Islamic Bioethical Governance of Heritable Gene Editing and Embryo Selection

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Abstract
Rapid developments in heritable genome editing and embryo selection have intensified ethical debates concerning therapeutic intervention, reproductive choice, human dignity, lineage, and responsibility toward future generations. This study examines how Islamic bioethics can govern these technologies beyond a narrow permissibility-based approach. It aims to analyze the construction of human dignity in Islamic bioethical discourse, compare Islamic ethical principles with international biomedical governance, and develop an integrated framework for evaluating reproductive genomic technologies. The study employs qualitative comparative normative document analysis of Islamic jurisprudential resolutions, international bioethical declarations and guidelines, regulatory documents, and relevant biomedical studies. The findings show that therapeutic genome editing may be ethically justified only when its clinical benefits remain proportionate to the risks and burdens of the entire treatment pathway. The analysis also demonstrates that the distinction between therapy and enhancement becomes unstable in embryo selection, particularly when testing shifts from severe monogenic disorders to probabilistic disease ranking and non-medical traits. Human dignity is therefore reconstructed through ontological, relational, institutional, and intergenerational dimensions. Based on these findings, the article proposes a dignity-based Islamic governance framework integrating therapeutic purpose, scientific validity, proportionality, lineage integrity, reproductive agency, intergenerational responsibility, and distributive justice. The study contributes theoretically by repositioning Islamic bioethics as a continuous, multidisciplinary, and evidence-responsive system of governance rather than a reactive mechanism for classifying emerging technologies as permissible or prohibited.

Keywords: *Islamic bioethics, human genome editing, embryo selection, human dignity, intergenerational justice*

INTRODUCTION

Human genome editing has moved from experimental research into clinical medicine, altering the ethical and regulatory terms of debate. CRISPR-Cas9 has made targeted genomic modification more precise than earlier gene-transfer methods. This transition became clinically tangible in December 2023, when the United States Food and Drug Administration approved Casgevy for sickle cell disease, the first FDA-authorized therapy to employ CRISPR-based genome editing.[1] The approval confirmed its therapeutic potential but also sharpened the distinction between somatic interventions, which affect an existing patient, and heritable interventions involving embryos, gametes, or germline cells whose effects may pass to future generations.[2]

The ethical stakes become more complex within reproductive medicine. Preimplantation genetic testing was initially developed to identify chromosomal abnormalities and pathogenic variants, but recent applications extend toward polygenic embryo screening, which estimates predisposition to common diseases or traits. Although embryo selection does not directly alter DNA, it determines which embryo is prioritized for implantation. Its reliability remains contested because polygenic predictions are probabilistic, may perform unevenly across ancestry groups, depend on environmental interaction, and are constrained by limited genetic variation among embryos from the same parents.[3] These limitations become especially significant when selection moves from preventing severe disease toward intelligence, height, appearance, athletic ability, or other preferred characteristics.

International institutions consequently frame genome editing as a governance problem rather than a question of technical feasibility alone. The World Health Organization recommends oversight through research registries, institutional accountability, public engagement, international cooperation, and equitable access.[4] The International Society for Stem Cell Research similarly maintains that reproductive use of heritable nuclear genome editing remains premature and would require substantial preclinical evidence, public deliberation, robust regulation, consideration of reproductive alternatives, and multigenerational monitoring.[5]

Human dignity occupies a foundational but contested position within these debates. UNESCO affirms that individuals must not be reduced to their genetic characteristics and connects the human genome with both human unity and diversity.[6] It later linked dignity with consent, privacy, equality, non-

[1] U S Food and Drug Administration, "FDA Approves First Gene Therapies to Treat Patients with Sickle Cell Disease," 2023.

[2] World Health Organization, "Violence Against Women Prevalence Estimates," 2021; World Health Organization, "Human Genome Editing: A Framework for Governance" (World Health Organization, 2021).

[3] G Lázaro-Muñoz et al., "Screening Embryos for Polygenic Conditions and Traits: Ethical Considerations for an Emerging Technology," *Genetics in Medicine*, 2021, 432–34, https://doi.org/10.1038/s41436-020-01019-3; J Johnston and L J Matthews, "Polygenic Embryo Testing: Understated Ethics, Unclear Utility," *Nature Medicine*, 2022, 446–48, https://doi.org/10.1038/s41591-022-01743-0.

[4] Organization, "Violence Against Women Prevalence Estimates"; World Health Organization, "Violence against Women Prevalence Estimates, 2018: Global, Regional and National Prevalence Estimates for Intimate Partner Violence against Women and Global and Regional Prevalence Estimates for Non-Partner Sexual Violence against Women" (Geneva: World Health Organization, 2021).

[5] International Society for Stem Cell Research, "Guidelines for Stem Cell Research and Clinical Translation" (International Society for Stem Cell Research, 2025).

[6] Scientific and Cultural Organization United Nations Educational, "Declaration on the Responsibilities of the Present Generations towards Future Generations" (UNESCO, 1997).

discrimination, social responsibility, and benefit sharing,[7] while also requiring present societies to consider the effects of scientific decisions on future generations.[8] Chan distinguishes dignity as intrinsic moral status from dignity as a relational condition shaped by social practices.[9] Genetic intervention may not remove intrinsic worth, yet selection systems may evaluate persons according to predicted health, intelligence, ability, or genomic conformity.

These questions are especially relevant to Islamic and Islamicate studies because emerging technologies intersect with Islamic conceptions of the body, creation, reproduction, kinship, lineage, responsibility, and legitimate treatment. Islamic bioethics is not reducible to scriptural prohibitions or isolated fatwas; it is shaped by theology, jurisprudence, legal theory, philosophical ethics, biomedical expertise, state regulation, professional practice, and lived experience.[10] Alhasan similarly argues that participation in genomic science may serve human welfare while distinguishing therapeutic intervention from reproductive manipulation that may harm descendants. Islamic engagement with science therefore turns on purpose, evidence, consequences, and safeguards.[11]

Contemporary Islamic deliberation has primarily relied on *maṣlaḥah*, *maqāṣid al-sharīʿah*, and jurisprudential maxims. These frameworks prioritize the protection of religion, life, intellect, lineage, and property while requiring benefit and the removal of harm. Dayan argues that severe genetic disease may justify intervention when expected benefit exceeds foreseeable injury.[12] Isa, however, shows that therapeutic intention alone does not establish *maṣlaḥah*; her analysis of the first gene-edited babies concludes that the experiment failed because its aims, risks, and alternatives did not preserve a greater public good.[13] Alsomali and Hussein likewise distinguish potentially therapeutic intervention from experimentation lacking sufficient safety, necessity, and regulatory justification.[14]

Institutional Islamic jurisprudence adopts a comparable conditional approach. Resolution No. 203 of the International Islamic Fiqh Academy addresses genetic diagnosis, gene therapy, reproductive testing, and protection of the human genome, emphasizing dignity, lineage, informed decision-making, and qualified

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[7] Scientific and Cultural Organization United Nations Educational, "Universal Declaration on Bioethics and Human Rights" (UNESCO, 2005).

[8] Scientific and Cultural Organization United Nations Educational, "Universal Declaration on the Human Genome and Human Rights" (UNESCO, 1997).

[9] Y Chan, "Bringing Breasts into the Mainstream," in *Masculinities and Hong Kong Cinema*, 2005, 177–97, https://www.scopus.com/inward/record.uri?eid=2-s2.0-84898287553&partnerID=40&md5=c47a1a966deb45930617339a08031765.

[10] A Sachedina, *Islamic Biomedical Ethics: Principles and Application* (Oxford University Press, 2009), https://doi.org/10.1093/acprof:oso/9780195378504.001.0001; M Ghaly, "COLLECTIVE RELIGIO-SCIENTIFIC DISCUSSIONS ON ISLAM AND HIV/AIDS: I. BIOMEDICAL SCIENTISTS," *Zygon* 48, no. 3 (2013): 671–708, https://doi.org/10.1111/zygo.12034; A I Padela, "Islamic Bioethics: Between Sacred Law, Lived Experiences, and State Authority," *Theoretical Medicine and Bioethics* 34, no. 2 (2013): 65–80, https://doi.org/10.1007/s11017-013-9249-1.

[11] M M Alhasan, "Human Genome and Gene Therapy in Islamic Law," *Scientific Journal of King Faisal University Basic and Applied Sciences* 22, no. 2 (2021): 18–24, https://doi.org/10.37575/h/art/2339.

[12] F Dayan, "CRISPR Cas-9 Genome Editing and Islam: A Religious Perspective," *Bangladesh Journal of Medical Science* 18, no. 1 (2019): 7–13, https://doi.org/10.3329/bjms.v18i1.39540.

[13] N M Isa, "Human Germline Gene Editing from Maslahah Perspective: The Case of the World's First Gene Edited Babies," *Journal of Bioethical Inquiry* 18, no. 2 (2021): 349–55, https://doi.org/10.1007/s11673-021-10101-7.

[14] N Alsomali and G Hussein, "CRISPR-Cas9 and He Jiankui's Case: An Islamic Bioethics Review Using Maqāṣid Al-Sharīʿah and Qawāʿid Fiqhiyyah," *Asian Bioethics Review*, 2021, 149–65, https://doi.org/10.1007/s41649-021-00167-1.

oversight.[15] Resolution No. 235 addresses CRISPR-Cas9 more directly, conditionally permitting genome editing for preventing or treating genetic disease when safety and effectiveness are established and regulation prevents abuse, while rejecting aesthetic and ameliorative uses and interventions understood to threaten lineage.[16] These resolutions are not categorical rejections, but leave unresolved how safety, competing objectives, and conditional permissibility should be governed.

Existing scholarship follows three major trends. The first applies *maqāṣid*, *maṣlaḥah*, and legal maxims to genome editing, clarifying therapeutic purpose, necessity, certainty, and harm prevention,[17] but often leaves these objectives insufficiently operationalized. The second examines the unstable boundary between treatment and enhancement, showing that judgments depend on purpose, consequences, and social definitions of normality.[18] The third focuses on embryo selection, reproductive technologies, and lineage. Chin show that polygenic embryo testing remains ethically problematic even without direct genome modification,[19] while studies of synthetic embryos and assisted reproduction emphasize kinship, familial responsibility, and lineage integrity.[20] Lala further identifies embryo status, lack of consent, inequality, eugenic misuse, and future-generation effects as central problems in germline editing.[21]

Three gaps remain. First, heritable genome editing and embryo selection are usually analyzed separately, although they belong to the same reproductive-genomic continuum. Prospective parents may face choices among natural conception, donor gametes, preimplantation testing, embryo selection, or future genome editing; treating these options separately obscures their common implications for reproductive authority, disability, genetic parenthood, and future children.[22] Second, Islamic bioethical scholarship remains centered on permissibility, even though conditional permission does not resolve unequal access, commercial exploitation, misleading prediction, data governance, or reproductive coercion. Padela warns that *maqāṣid*-based bioethics becomes indeterminate when broad objectives lack clear hierarchy and practical

[15] International Islamic Fiqh Academy, "Resolution No. 203 (9/21): Heredity, Genetic Engineering and the Human Genome" (Organisation of Islamic Cooperation, 2013).

[16] International Islamic Fiqh Academy, "Resolution No. 235 (6/24): The Human Genome and Future Bioengineering" (Organisation of Islamic Cooperation, 2019).

[17] Dayan, "CRISPR Cas-9 Genome Editing and Islam: A Religious Perspective"; Isa, "Human Germline Gene Editing from Maslahah Perspective: The Case of the World's First Gene Edited Babies"; Alsomali and Hussein, "CRISPR-Cas9 and He Jiankui's Case: An Islamic Bioethics Review Using Maqāṣid Al-Sharīʿah and Qawāʿid Fiqhiyyah."

[18] A Shabana, "Between Treatment and Enhancement: Islamic Discourses on the Boundaries of Human Genetic Modification," *Journal of Religious Ethics*, 2022, 386–411, https://doi.org/10.1111/jore.12404.

[19] A H B Chin et al., "Islamic Perspectives on Polygenic Testing and Selection of IVF Embryos (PGT-P) for Optimal Intelligence and Other Non–Disease-Related Socially Desirable Traits," *Journal of Bioethical Inquiry* 21, no. 3 (2024): 441–48, https://doi.org/10.1007/s11673-023-10293-0.

[20] A Nurusshofa et al., "Fiqh Issues in Assisted Reproductive Technology: IVF, Surrogacy, and Lineage in the Biomedical Era," *SALIHA: Jurnal Pendidikan Islam*, 2026, 19–42, https://doi.org/10.54396/saliha.v9i1.2423; S M Muhsin et al., "Synthetic Human Embryos, Embryo Models and Embryo-like Structures in Islam," *Theology and Science* 22, no. 4 (2024): 790–815, https://doi.org/10.1080/14746700.2024.2399902.

[21] I Lala, "Germ-Inating Solutions or Gene-Rating Problems: An Islamic Perspective on Human Germline Gene Editing," *Journal of Religion and Health* 59, no. 4 (2020): 1855–69, https://doi.org/10.1007/s10943-019-00770-5.

[22] S Segers, "Heritable Genome Editing: Ethical Aspects of a Developing Domain," *Human Reproduction*, 2023, 2055–61, https://doi.org/10.1093/humrep/dead167.

mechanisms.[23] Third, dignity is frequently invoked but rarely operationalized. *Karāmah* may support bodily integrity, lineage, privacy, equality, or disease prevention, yet these commitments can lead to competing conclusions.

This study addresses these gaps by developing a dignity-based Islamic bioethical governance framework for heritable genome editing and embryo selection. It asks how dignity is conceptualized in Islamic bioethical discourse; how Islamic principles of dignity, protection of life and progeny, harm prevention, necessity, and public benefit converge with or diverge from global principles of autonomy, equality, precaution, and intergenerational responsibility; and what governance framework can distinguish defensible therapeutic and preventive uses from enhancement, discriminatory selection, reproductive commodification, and emergent eugenic practices.

The study aims to examine Islamic normative treatments of heritable genome editing and embryo selection, compare them with international bioethical frameworks, and develop an integrated governance model. Its framework combines *karāmah*, *maqāṣid al-sharīʿah*, *maṣlaḥah*, legal maxims, and intergenerational justice. Dignity is analyzed through ontological dignity, which affirms equal human worth; relational dignity, which concerns kinship, disability inclusion, and reproductive responsibility; and institutional dignity, which requires accountable regulation, transparency, equitable access, and protection against discrimination.

The article's novelty lies in moving beyond technology-specific and permissibility-centered analysis toward an integrated theory of reproductive genomic governance. It connects Islamic juridical reasoning with contemporary genomic evidence and global bioethical governance, asking not only whether genome editing or embryo selection may be permitted, but under what scientific, moral, institutional, and distributive conditions their use can remain consistent with human dignity and justice toward future generations.

MEtTHOD

This study employed a qualitative design using comparative normative document analysis. The approach was selected because the research aimed to interpret and compare ethical reasoning, regulatory assumptions, and institutional recommendations concerning heritable genome editing and embryo selection rather than measure prevalence, attitudes, or causal relationships. Qualitative document analysis is appropriate for examining how meanings, values, and normative positions are constructed within specific intellectual and institutional contexts.[24] Documents were treated not only as sources of information but also as institutional products that classify technologies, define legitimate medical purposes, distribute authority, and shape public policy.[25]

The corpus consisted of three categories. First, Islamic normative documents included Resolution No. 203 on heredity, genetic engineering, and the human genome and Resolution No. 235 on the human genome and future bioengineering issued by the International Islamic Fiqh Academy.[26] Second, international bioethical and regulatory documents included UNESCO declarations

[23] A I Padela, "Using the Maqāṣid Al-Sharīʿah to Furnish an Islamic Bioethics: Conceptual and Practical Issues," *Journal of Bioethical Inquiry* 16, no. 3 (2019): 347–52, https://doi.org/10.1007/s11673-019-09940-2.

[24] John W Creswell and Cheryl N Poth, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 4th ed. (Sage, 2018); J A Maxwell, *Qualitative Research Design: An Interactive Approach* (SAGE, 2013).

[25] Lindsay Prior, *Using Documents in Social Research* (London: SAGE Publications, 2003).

[26] Academy, "Resolution No. 203 (9/21): Heredity, Genetic Engineering and the Human Genome"; Academy, "Resolution No. 235 (6/24): The Human Genome and Future Bioengineering."

on the human genome, bioethics, and future generations; WHO governance documents on human genome editing; ISSCR guidelines; professional positions issued by ESHRE and ASRM; and FDA decisions concerning exagamglogene autotemcel.[27] Third, original biomedical studies were used to assess clinical efficacy, adverse events, predictive utility, and professional uncertainty, including studies of CRISPR-based treatment and polygenic embryo selection.

Documents were identified through Scopus, Web of Science, PubMed, and official institutional websites. Criterion-based purposive sampling was applied. Sources were included when they were issued by authoritative institutions or peer-reviewed outlets, directly addressed genome editing, reproductive genetics, dignity, lineage, or governance, and contained verifiable normative or empirical evidence. News reports, duplicated texts, unsupported commentary, and unrelated biomedical studies were excluded. The study was therefore not designed as an exhaustive systematic review and did not use PRISMA-based claims of comprehensive coverage.

The unit of analysis was a normative or evidentiary segment, including resolution clauses, recommendations, reported findings, and arguments relevant to the research questions. A structured extraction matrix recorded document provenance, technological application, treatment–enhancement classification, conceptions of dignity, *ḥifẓ al-nafs*, *ḥifẓ al-nasl*, harm, necessity, consent, justice, lineage, scientific validity, and institutional safeguards.

Analysis proceeded through iterative coding and thematic comparison. Deductive codes were derived from the theoretical framework, including ontological, relational, institutional, and intergenerational dignity; *maṣlaḥah*; proportionality; reproductive agency; lineage integrity; distributive justice; and responsibility toward future persons. Inductive coding identified additional themes such as whole-pathway proportionality, ancestry bias, algorithmic opacity, commercial reproductive pressure, and regulatory *ijtihād*. Coding procedures were informed by Saldaña,[28] while thematic development followed Braun and Clarke.[29] Comparative matrices were then used to identify convergence, divergence, contradiction, and conceptual silence across Islamic, international, professional, and biomedical sources.[30]

The analysis generated four themes: therapeutic genome editing as a conditional moral good; instability of the therapy–enhancement boundary; multidimensional dignity and intergenerational responsibility; and the transition from permissibility-centred fatwas to continuous bioethical governance. Trustworthiness was strengthened through source triangulation, primary-source verification, code–recode review, negative-case analysis, and maintenance of an analytical audit trail. Because the study used publicly available documents and published research without identifiable human data, institutional ethical approval was not required. Its principal limitation is that document analysis cannot directly

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[27] United Nations Educational, "Declaration on the Responsibilities of the Present Generations towards Future Generations"; United Nations Educational, "Universal Declaration on the Human Genome and Human Rights"; United Nations Educational, "Universal Declaration on Bioethics and Human Rights"; Organization, "Violence against Women Prevalence Estimates, 2018: Global, Regional and National Prevalence Estimates for Intimate Partner Violence against Women and Global and Regional Prevalence Estimates for Non-Partner Sexual Violence against Women"; Organization, "Violence Against Women Prevalence Estimates"; Research, "Guidelines for Stem Cell Research and Clinical Translation."

[28] Johnny Saldaña, *The Coding Manual for Qualitative Researchers* (Sage, 2021).

[29] Virginia Braun and Victoria Clarke, *Thematic Analysis: A Practical Guide* (SAGE, 2021).

[30] M B Miles, A M Huberman, and J Saldaña, *Qualitative Data Analysis: A Methods Sourcebook*, 4th ed. (SAGE Publications, 2020).

represent the experiences of patients, clinicians, disability communities, or Muslim publics.

RESULTS AND DISCUSSION

Therapeutic Genome Editing as a Conditional Moral Good: Clinical Efficacy, Risk, and *Maqāṣid*-Based Proportionality

The study's most fundamental finding is that somatic genome editing may constitute a conditional moral good within Islamic bioethics when it addresses a serious medical condition, rests on credible clinical evidence, and satisfies proportionality across the entire therapeutic pathway. Its ethical legitimacy cannot be inferred from the precision of the molecular edit alone. It depends equally on cell collection, conditioning, transplantation, hospitalization, adverse-event management, long-term surveillance, informed consent, institutional competence, and equitable access. This finding replaces a technology-centred assessment of CRISPR with a patient-centred model of whole-pathway proportionality.

Exagamglogene autotemcel, marketed as Casgevy, provides the clearest clinical case. The treatment uses autologous CD34-positive haematopoietic stem and progenitor cells edited ex vivo with CRISPR-Cas9 at the erythroid-specific enhancer region of *BCL11A*. Disrupting this regulatory region increases fetal haemoglobin expression, thereby reducing sickling in sickle cell disease and compensating for deficient adult haemoglobin production in transfusion-dependent ß-thalassaemia. Patients must nevertheless undergo stem-cell mobilization and collection, pharmacokinetically adjusted myeloablative conditioning with busulfan, infusion of the edited cells, haematopoietic recovery, and extended follow-up. The therapy is therefore better understood as a gene-edited autologous transplantation pathway than as a discrete genomic correction.

The phase 3 sickle cell disease study provides strong but bounded evidence of benefit. Forty-four participants received exagamglogene autotemcel and had a median follow-up of 19.3 months. Among the 30 participants with sufficient follow-up for the primary efficacy analysis, 29, or 97%, remained free from severe vaso-occlusive crises for at least 12 consecutive months. All 30 remained free from hospitalization for severe vaso-occlusive crises during the corresponding evaluation period. No malignancies were reported during the available follow-up, and the adverse-event profile was considered broadly consistent with myeloablative busulfan conditioning and autologous stem-cell transplantation.[31]

Comparable results were obtained in transfusion-dependent ß-thalassaemia. Fifty-two participants received exagamglogene autotemcel and were followed for a median of 20.4 months. Of the 35 participants who had sufficient follow-up for the primary analysis, 32 achieved transfusion independence for at least 12 consecutive months, corresponding to 91% of the evaluable population. During transfusion independence, mean total haemoglobin reached 13.1 g/dL, mean fetal haemoglobin reached 11.9 g/dL, and fetal haemoglobin was distributed across at least 94% of circulating erythrocytes. No deaths or cancers were reported in that interim analysis.[32]

These results support the conclusion that somatic editing can produce clinically substantial disease modification. They do not, however, establish risk-free treatment or lifelong durability. Both pivotal studies were open-label, single-

[31] H Frangoul et al., "Exagamglogene Autotemcel for Severe Sickle Cell Disease," *New England Journal of Medicine*, 2024, 1649–62, https://doi.org/10.1056/NEJMoa2309676.

[32] Frangoul et al.

group trials involving carefully selected participants, and their median follow-up remained relatively short compared with the expected lifespan of recipients. The absence of malignancy during the reported observation period cannot be interpreted as proof that delayed oncogenic, clonal, reproductive, or other long-term effects will not emerge. Araki and Ishii had already emphasized that legitimate consent for genome-editing interventions requires communication of off-target risks and scientific uncertainty rather than reassurance based solely on technical precision.[33] Iancu's analyses similarly locate genome editing within the conventional clinical obligations of non-maleficence, beneficence, autonomy, and justice, while stressing that unknown and unintended effects remain relevant even when the therapeutic target is well defined.[34]

The paediatric evidence makes the coexistence of benefit and burden particularly visible. In two ongoing studies involving children aged five to eleven, 15 children with transfusion-dependent ß-thalassaemia and 11 with sickle cell disease received exagamglogene autotemcel. All eight children with ß-thalassaemia who had reached the required follow-up were transfusion independent, while all eight evaluable children with sickle cell disease remained free from severe vaso-occlusive crises. The remaining participants had not yet reached the prespecified assessment point. Every treated child experienced at least one grade 3 or 4 adverse event. Two children with ß-thalassaemia developed severe hepatic veno-occlusive disease attributed to busulfan conditioning, and one died.[35]

The United States Food and Drug Administration initially approved Casgevy for sickle cell disease in patients aged 12 years and older in December 2023 and for transfusion-dependent ß-thalassaemia in the same age group in January 2024. On 1 July 2026, the indication was expanded to eligible patients aged two years and older for both conditions.[36] The regulatory expansion confirms growing confidence in the therapy's benefit-risk profile, but it should not be conflated with the published paediatric trial population, which consisted of children aged five to eleven. Regulatory authorization and published clinical evidence are related but analytically distinct forms of knowledge.

The combined evidence reveals a consistent pattern: genomic correction may be highly effective while the therapeutic infrastructure required to deliver it remains medically hazardous. The principal risks observed in the paediatric study were not presented as failures of the intended *BCL11A* edit but as consequences of busulfan conditioning and the transplantation pathway. This distinction is clinically relevant, yet it cannot remove those harms from ethical evaluation. Patients experience the treatment as an integrated intervention, not as separate molecular and procedural components. A morally adequate assessment must therefore consider editing accuracy together with myeloablation, infection risk, hepatic toxicity, infertility, organ damage, hospitalization, psychological burden,

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[33] M Araki and T Ishii, "Providing Appropriate Risk Information on Genome Editing for Patients," *Trends in Biotechnology*, 2016, 86–90, https://doi.org/10.1016/j.tibtech.2015.12.002.

[34] D Iancu, "Genomic Editing: From Human Health to the 'Perfect Child,'" in *Clinical Ethics at the Crossroads of Genetic and Reproductive Technologies, Second Edition*, 2023, 1–32, https://doi.org/10.1016/B978-0-443-19045-2.00003-9; D Iancu, "Genomic Editing-from Human Health to the 'Perfect Child,'" in *Clinical Ethics at the Crossroads of Genetic and Reproductive Technologies*, 2018, 1–30, https://doi.org/10.1016/B978-0-12-813764-2.00001-5.

[35] H Frangoul et al., "Exa-Cel in Children with Transfusion-Dependent ß-Thalassemia or Sickle Cell Disease," *New England Journal of Medicine*, 2026, https://doi.org/10.1056/NEJMoa2603387.

[36] Administration, "FDA Approves First Gene Therapies to Treat Patients with Sickle Cell Disease"; U S Food and Drug Administration, "FDA Approves First Gene Therapy to Treat Patients with Transfusion-Dependent Beta-Thalassemia," 2024; U S Food and Drug Administration, "FDA Approves First Gene Therapy for Young Children with Sickle Cell Disease," 2026.

loss of employment or schooling, long-term surveillance, and the possibility that patients may have safer alternatives.

This whole-pathway approach refines the idea of therapeutic necessity. Necessity should not mean that genome editing is permissible whenever it has a medical purpose. It requires a serious condition, a plausible prospect of substantial benefit, and an assessment of whether established alternatives can offer comparable outcomes with lower burdens. Bubela, Mansour, and Nicol accordingly call for a proportionate response based on realistic estimates of benefit, risk, and translational timelines rather than either technological enthusiasm or categorical rejection.[37] Coller similarly argues that somatic genome editing should initially be assessed through established gene-therapy standards, including rigorous preclinical evidence, independent oversight, and continuing safety monitoring.[38] Palazzani further places therapeutic purpose within a wider framework of human rights, self-determination, safety, and the distinction between somatic and germline intervention.[39]

Therapeutic necessity also varies between diseases and stages of translation. Sickle cell disease and transfusion-dependent ß-thalassaemia now have regulatory and phase 3 evidence for an ex vivo CRISPR-based therapy. By contrast, somatic editing for inherited cardiomyopathies remains at an earlier translational stage. Interviews with 18 Dutch patients, mutation carriers, clinicians, researchers, and regulators found broad support for continued development, but support was qualified by the principle of providing "the right treatment for the right person at the right time." Participants emphasized incomplete penetrance, patient selection, costs, technical delivery, and uncertainty concerning who would develop severe disease.[40] Thus, an intervention that may be proportionate for a patient with progressive and otherwise inadequately treated disease may be disproportionate for an asymptomatic carrier whose probability and timing of illness remain uncertain.

Genome editing has also been explored conceptually or experimentally for infectious diseases such as HIV and for several inherited disorders, but the evidentiary maturity of these applications should not be equated with that of Casgevy. Reviews by Iancu describe the potential to correct pathogenic mutations or alter immune pathways, but they also emphasize unknown effects and the need for case-specific risk-benefit assessment.[41] Schweikart distinguishes the governance of somatic interventions, which can be addressed primarily through national clinical and regulatory systems, from heritable applications requiring additional international oversight.[42] Therapeutic potential is therefore an indication for carefully governed research, not evidence that every proposed somatic application has already satisfied clinical necessity.

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[37] T Bubela, Y Mansour, and D Nicol, "The Ethics of Genome Editing in the Clinic: A Dose of Realism for Healthcare Leaders," *Healthcare Management Forum* 30, no. 3 (2017): 159–63, https://doi.org/10.1177/0840470416689313.

[38] B S Coller, "Ethics of Human Genome Editing," *Annual Review of Medicine* 70 (2019): 289–305, https://doi.org/10.1146/annurev-med-112717-094629.

[39] L Palazzani, "Gene-Editing: Ethical and Legal Challenges," *Medicina e Morale* 72, no. 1 (2023): 49–58, https://doi.org/10.4081/mem.2023.1227.

[40] J N Simons et al., "Moral Attitudes on Somatic Gene Editing for Inherited Cardiomyopathy: A Qualitative Interview Study with Key Stakeholders in the Netherlands," *Journal of Bioethical Inquiry*, 2026, https://doi.org/10.1007/s11673-026-10565-5.

[41] Iancu, "Genomic Editing: From Human Health to the 'Perfect Child'"; Iancu, "Genomic Editing-from Human Health to the 'Perfect Child.'"

[42] S J Schweikart, "Governance in the Era of CRISPR and DIY-Bio Regulatory Guidance of Human Genome Editing at the National and Global Levels," in *Consumer Genetic Technologies: Ethical and Legal Considerations*, 2021, 65–76, https://doi.org/10.1017/9781108874106.007.

Stakeholder evidence further demonstrates that proportionality cannot be defined only by investigators and regulators. Persaud conducted 15 focus groups involving 46 patients with sickle cell disease, 41 parents, and 23 haematologists.[43] Participants expressed hope that genome editing might reduce pain and transform the course of the disease, but they also identified uncertainty, fertility, the burden of participation, trust, affordability, and equitable access as central concerns. Unknown long-term effects were discussed in 12 of the 15 focus groups, and all stakeholder categories raised questions about who benefit would ultimately. The findings show that clinical benefit acquires moral legitimacy through transparent engagement with the communities that bear the risks of experimentation and implementation.[44]

This social dimension is also visible outside high-income clinical settings. Jibrilla, Raji, and Okeke's Nigerian study included 268 respondents 188 members of the public and 80 health workers or bioscientists. Public knowledge of genome editing and mitochondrial replacement was limited, but disease-preventing and curative applications received support. Morality and religion influenced attitudes, although their effects were not uniform.[45] The findings caution against treating "public acceptance" as a stable or culturally transferable variable. Governance in Muslim and religiously plural societies requires accessible scientific education, meaningful public deliberation, and sensitivity to local disease burdens and institutional trust.

Within Islamic bioethics, the strongest affirmative justification for somatic therapeutic editing is *ḥifẓ al-nafs*, the protection of life. This objective should not be restricted to the prevention of death. Freedom from recurrent vaso-occlusive crises, avoidance of stroke and organ damage, independence from lifelong transfusion, and improvement in functional health are substantive forms of preserving life and well-being. The jurisprudential maxim *al-ḍarar yuzāl* harm should be removed supports intervention when a serious disease can be substantially alleviated or prevented.

The maxim cannot, however, be separated from the prohibition against removing one harm by producing an equal or greater harm. The relevant comparison is not between disease and the intended genetic correction in abstraction, but between the likely trajectory without treatment and the complete set of benefits and burdens generated by treatment. This interpretation makes *maqāṣid al-sharīʿah* a method of structured proportional reasoning rather than a list of objectives invoked after a conclusion has already been reached.

Resolution No. 203 of the International Islamic Fiqh Academy permits genetic treatment of somatic cells when it serves a legitimate medical purpose, is expected to provide benefit, does not create greater harm, and is undertaken by qualified specialists. It also stresses professional competence, confidentiality, prevention of exploitation, institutional regulation, and assistance for those unable to bear the costs of genetic services.[46] Resolution No. 235 applies this reasoning directly to CRISPR-Cas9, allowing genome editing only when safety and effectiveness are accredited by relevant medical authorities, the purpose is the

[43] A Persaud et al., "A CRISPR Focus on Attitudes and Beliefs toward Somatic Genome Editing from Stakeholders within the Sickle Cell Disease Community," *Genetics in Medicine* 21, no. 8 (2019): 1726–34, https://doi.org/10.1038/s41436-018-0409-6.

[44] Persaud et al.

[45] M Jibrilla, H Raji, and M I Okeke, "Survey of Attitude to Human Genome Modification in Nigeria," *Journal of Community Genetics* 15, no. 1 (2024): 1–11, https://doi.org/10.1007/s12687-023-00689-1.

[46] Academy, "Resolution No. 203 (9/21): Heredity, Genetic Engineering and the Human Genome."

prevention or treatment of genetic disease, and stringent regulatory procedures protect patient dignity and prevent abuse.[47]

These resolutions establish that Islamic jurisprudential authority does not treat all genomic intervention as an unlawful alteration of creation. Their reasoning is purposive and conditional. Yet the clinical data extend their normative implications. "Safety and effectiveness" cannot be assessed only by whether the edit reaches its intended locus or whether a primary endpoint is achieved. In the exagamglogene autotemcel pathway, the moral assessment must include conditioning toxicity and transplantation-related burdens. The resolutions' requirement that treatment not cause greater harm therefore supports whole-pathway proportionality rather than a narrow evaluation of CRISPR accuracy.

This finding supports but also refines Alsomali and Hussein's application of *maqāṣid al-sharīʿah* and *qawāʿid fiqhiyyah* to genome editing.[48] Their analysis demonstrates that therapeutic intervention can be distinguished from scientifically and ethically unjustified experimentation through intention, necessity, certainty, benefit, and harm prevention. The present evidence adds that these principles must be applied to the full clinical system surrounding an edit. The same therapy may protect life by eliminating recurrent crises while threatening fertility, imposing severe conditioning toxicity, or excluding those without access to specialized centres. *Ḥifẓ al-nafs* consequently cannot function as an automatic authorization once therapeutic intent has been declared.

Nor is the therapy-enhancement boundary entirely self-executing. Comparative religious bioethics has similarly argued that genetic intervention should be judged by whether it is ordered toward healing and human flourishing rather than technological perfection, although religious traditions differ in their theological premises and moral vocabularies.[49] Austriaco's prudential account of bodily modification and Oh's critique of genetic perfectionism help clarify a distinction that also matters in Islamic reasoning: restoring or preserving a seriously impaired capacity is ethically different from engineering competitive advantage. Nevertheless, interventions described as "therapeutic enhancement" may occupy an intermediate space when they improve biological functioning beyond the minimum required to control disease. The classification must therefore remain tied to disease burden, clinical purpose, proportionality, and social effects rather than terminology alone.

A dignity-based interpretation further requires autonomy and justice. Cinà emphasizes that beneficent genomic intervention must remain compatible with informed consent, privacy, and universal access,[50] while Palazzani links therapeutic legitimacy to human rights and protection from unsafe or enhancement-driven use.[51] In Islamic terms, patient dignity is not exhausted by receiving an effective treatment. It includes receiving comprehensible information, retaining the ability to decline, being protected from exploitation, and not being excluded solely because of socioeconomic position.

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[47] Academy, "Resolution No. 235 (6/24): The Human Genome and Future Bioengineering."

[48] Alsomali and Hussein, "CRISPR-Cas9 and He Jiankui's Case: An Islamic Bioethics Review Using Maqāṣid Al-Sharīʿah and Qawāʿid Fiqhiyyah."

[49] N P G Austriaco, *Biomedicine and Beatitude: An Introduction to Catholic Bioethics* (Catholic University of America Press, 2021); J J Oh, "Editing Eden: CRISPR, the Image of God, and the Ethics of Genetic Intervention," *Linacre Quarterly* , 2026, https://doi.org/10.1177/00243639261430433.

[50] C S Cinà, "Autonomy and Beneficence in Genetic Manipulation," in *Medical Ethics: The Surgeon's Perspective*, 2025, 91–104, https://doi.org/10.1007/978-3-032-04866-0_6.

[51] Palazzani, "Gene-Editing: Ethical and Legal Challenges."

UNESCO's Universal Declaration on Bioethics and Human Rights reinforces this conclusion by connecting scientific benefit with human dignity, consent, equality, social responsibility, health-care access, and benefit sharing.[52] Its normative logic is especially important for therapies whose development depends on patients from historically underserved communities, but whose delivery requires exceptional technical and financial capacity. A therapy can be clinically transformative while remaining institutionally unjust if the populations that bore the disease burden and research risks are systematically unable to access it.

The governance implications extend beyond approval. Hirsch argue that responsible genome-editing research requires transparent practices, institutional supervision, and public accountability.[53] Lei and Qiu similarly show that effective regulation cannot be reduced to either scientific self-regulation or punitive state control; it requires an ethically anticipatory framework combining transparency, education, oversight, and enforceable standards.[54] Coller, Schweikart and Bubela converge on the need for proportionate regulation responsive to the differences between somatic and heritable interventions and to the actual maturity of each application.[55]

For Islamic bioethical governance, these findings imply that a fatwa permitting therapeutic genome editing should not function as a timeless or technologically generic authorization. Conditional permissibility should be accompanied by institutional criteria: accredited treatment centres, independent review, disease-specific eligibility standards, transparent comparison with alternatives, fertility counselling, long-term patient registries, adverse-event reporting, protection of genetic data, community engagement, and periodic reassessment as clinical evidence changes. Religious authority must engage continuously with empirical evidence rather than treating biomedical facts as a fixed preliminary stage preceding normative judgment.

This approach also transforms Islamic knowledge production. Scientists determine what an intervention does, clinicians describe its burdens, patients disclose how those burdens affect lived experience, regulators assess evidence and institutional capacity, and jurists evaluate these findings through Islamic normative principles. None of these actors can govern the technology adequately in isolation. Future-oriented *ijtihād* therefore requires an epistemic structure in which clinical evidence and Islamic ethical reasoning remain distinct but mutually accountable.

Somatic genome editing is consequently defensible as a conditional moral good only when it treats serious disease and meets whole-pathway proportionality. Its clinical success strengthens the Islamic obligation to relieve suffering, but it does not suspend the obligations to prevent greater harm, preserve informed agency, monitor long-term consequences, regulate institutional practice, and distribute biomedical benefits justly. For future-oriented Islamic and Islamicate

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[52] United Nations Educational, "Universal Declaration on Bioethics and Human Rights."

[53] F Hirsch, R Iphofen, and Z Koporc, "Ethics Assessment in Research Proposals Adopting CRISPR Technology," *Biochemia Medica* 29, no. 2 (2019): 206–13, https://doi.org/10.11613/BM.2019.020202.

[54] R Lei and R Qiu, "Ethical and Regulatory Issues in Human Gene Editing: Chinese Perspective," *Biotechnology and Applied Biochemistry* 67, no. 6 (2020): 880–91, https://doi.org/10.1002/bab.2032.

[55] Coller, "Ethics of Human Genome Editing"; Schweikart, "Governance in the Era of CRISPR and DIY-Bio Regulatory Guidance of Human Genome Editing at the National and Global Levels"; Bubela, Mansour, and Nicol, "The Ethics of Genome Editing in the Clinic: A Dose of Realism for Healthcare Leaders."

studies, the decisive shift is from asking whether CRISPR is permissible in principle to examining how therapeutic benefit, clinical burden, religious authority, public trust, and institutional justice are continuously governed in practice.

Embryo Selection and the Instability of the Therapy-Enhancement Boundary

The central theoretical tension identified in this study is that embryo selection cannot be governed adequately through a binary distinction between therapy and enhancement because its moral character depends not only on the trait being selected against, but also on the quality of prediction, severity and penetrance of the condition, reproductive context, available alternatives, and institutional architecture through which embryos are ranked. Preimplantation genetic testing for a severe monogenic disorder and polygenic selection for intelligence may employ related laboratory procedures, yet they differ substantially in evidentiary certainty, medical purpose, and social meaning. The relevant ethical problem is therefore not simply whether selection is therapeutic or enhancing, but how reproductive genomics transforms statistical associations into decisions about which prospective person should be brought into existence.

Resolution No. 203 of the International Islamic Fiqh Academy provides a defensible normative basis for preimplantation genetic testing when it is used to identify serious genetic disease. The resolution permits examination of reproductive material and preimplantation diagnosis under conditions that include legitimate medical purpose, specialist competence, confidentiality, non-directive counselling, and procedures that prevent the mixing or misidentification of gametes and embryos. Its reasoning connects disease prevention with the protection of progeny while preserving voluntary reproductive decision-making and laboratory integrity.[56] This position is most readily applicable to monogenic disorders in which a pathogenic variant has a comparatively strong and clinically interpretable relationship with disease.

The conceptual difficulty begins when this model is extended to polygenic embryo screening. A monogenic test generally asks whether an embryo carries a defined variant associated with a particular disorder. Polygenic screening aggregates large numbers of genetic variants, each contributing a small statistical effect, to estimate relative liability to multifactorial conditions or traits. The resulting score is not a diagnosis and does not establish the future phenotype of a particular embryo. Its performance depends on the population in which the score was developed, ancestry transferability, disease prevalence, environmental exposure, parental genetic profiles, the number of embryos available, and the selection strategy used. The method therefore moves reproductive medicine from identifying a comparatively determinate pathogenic variant toward comparing uncertain probabilities among genetically similar sibling embryos.

Quantitative modelling illustrates why this distinction matters. Karavani estimated that, under assumptions involving five viable embryos and the predictive scores then available, selecting the embryo with the highest score could produce an average gain of approximately 2.5 centimetres in height or 2.5 IQ points.[57] These averages were accompanied by wide prediction intervals. Analysis of large families also showed that the sibling with the highest polygenic score for

[56] Academy, "Resolution No. 203 (9/21): Heredity, Genetic Engineering and the Human Genome."

[57] E Karavani et al., "Screening Human Embryos for Polygenic Traits Has Limited Utility," *Cell*, 2019, 1424-1435.e8, https://doi.org/10.1016/j.cell.2019.10.033.

height was frequently not the tallest. The finding does not establish that polygenic selection has no statistical effect; it demonstrates that a modest mean shift across simulated cases cannot reliably predict the phenotype of a particular future child.[58]

Disease-oriented screening presents a related but more complicated problem. Lencz showed that estimated utility varies according to disease prevalence, predictive power, parental risk, number of embryos, and the rule used to select among them.[59] Excluding only embryos with exceptionally high scores produces relatively small reductions, whereas selecting the embryo with the lowest available score may produce larger relative reductions under favourable assumptions. For schizophrenia, selecting the lowest-risk embryo from five was modelled to reduce relative risk by approximately half. Because the baseline population risk is about 1%, however, the corresponding absolute reduction is approximately 0.5 percentage points. A child selected through this strategy would still face residual risk, while an unselected embryo would already have approximately a 99% probability of not developing the disorder.[60]

The contrast between relative and absolute risk exposes a methodological and ethical weakness in the commercial presentation of polygenic screening. A reduction of approximately 50% may appear clinically transformative when expressed relatively, even though the absolute difference may be less than one percentage point. Consent based on relative figures alone can therefore be formally valid but epistemically defective. Responsible counselling must disclose baseline risk, absolute risk reduction, uncertainty intervals, ancestry limitations, the number of available embryos, possible pleiotropic effects, and the continuing possibility that the selected child will develop the condition. It must also explain that selecting against one estimated liability may unintentionally alter the probability of other correlated traits.

This limitation is reinforced by analyses of polygenic scores across multiple conditions. Turley identify factors that reduce predictive performance when scores derived from unrelated adults are applied to selection among sibling embryos.[61] These include restricted genetic variation among siblings, incomplete predictive power, gene environment interaction, pleiotropy, and uneven performance across ancestral populations. Their analysis also warns that embryo selection could increase inequality, alter population distributions, devalue characteristics, and extend from disease prevention into educational attainment, income, or intelligence. The ethical problem is therefore not merely low accuracy; it is the conversion of limited statistical information into reproductive classifications carrying social and moral authority.

Recent scholarship consequently characterizes current polygenic embryo screening as substantially technology-driven rather than securely evidence-based. Siermann find that commercial introduction has preceded consensus concerning clinical validity, utility, ethical acceptability, and societal consequences.[62] Their review emphasizes that population-level associations cannot be transferred automatically to individual embryos and that the practical constraints of in vitro fertilization further reduce expected benefits. Many IVF cycles produce few transferable embryos, and patients may ultimately have no meaningful choice

[58] Karavani et al.

[59] T Lencz et al., "Utility of Polygenic Embryo Screening for Disease Depends on the Selection Strategy," *ELife*, 2021, e64716, https://doi.org/10.7554/eLife.64716.

[60] Lencz et al.

[61] P Turley et al., "Problems with Using Polygenic Scores to Select Embryos," *New England Journal of Medicine* 385, no. 1 (2021): 78–86, https://doi.org/10.1056/NEJMsr2105065.

[62] M Siermann et al., "Polygenic Embryo Screening: Quo Vadis?," *Journal of Assisted Reproduction and Genetics* 41, no. 7 (2024): 1719–26, https://doi.org/10.1007/s10815-024-03169-8.

among embryos with materially different scores. The existence of an algorithmic ranking system does not itself create clinically useful options.

Professional guidance reflects this evidentiary uncertainty. The European Society of Human Reproduction and Embryology concluded in 2022 that clinical use was unproven and ethically problematic because individual prediction intervals remained broad, only a limited number of embryos would ordinarily be available, and every embryo could carry some comparatively elevated score. ESHRE considered clinical introduction highly undesirable under the available evidence, while leaving open the possibility that future applications might become useful for narrowly defined populations.[63]

The 2026 ethics opinion of the American Society for Reproductive Medicine, prepared by its Ethics and Practice Committees with contributors including Sigal Klipstein, similarly states that preimplantation testing for polygenic disorders is not ready for routine clinical use and should not be used for non-medical trait selection. The opinion treats trait selection as outside the proper scope of reproductive medicine and identifies persistent concerns regarding predictive accuracy, clinical utility, equity, and informed consent.[64] The importance of this position lies not in categorically rejecting every possible future use, but in refusing to treat commercial availability as evidence of clinical maturity.

The distinction between medical and non-medical purposes nevertheless remains unstable. A severe, highly penetrant childhood disorder presents a relatively strong preventive justification. A late-onset condition with incomplete penetrance presents a more ambiguous case because an embryo carrying the relevant liability may never develop the disease, may develop it only late in life, or may benefit from future prevention and treatment. Polygenic selection for common disorders is more uncertain still because it compares relative probabilities rather than identifying a determinate disease-causing variant. Selection for height, intelligence, appearance, or educational attainment moves further toward optimization according to socially valued traits. These categories form a normative continuum rather than a set of self-evident boundaries.

Ishii captures this instability by distinguishing cautious possible use for serious late-onset disease from selection for health or intelligence under substantial clinical uncertainty.[65] He argues that environmental influences, the autonomy of future children, and the inability of scores to guarantee expected outcomes create risks of false parental expectations, objectification, and trait-based stigma. His analysis supports a precautionary approach in which policy may restrict or prohibit polygenic selection while allowing future reconsideration for serious disease if clinical validity and utility improve. This position challenges both categorical technological prohibition and market-led permissiveness.

The Islamic bioethical literature reaches a similar conclusion through a different normative vocabulary. Chin argue that the absence of physical genome modification does not make polygenic embryo selection for intelligence and other non-disease traits morally neutral. Their analysis applies the jurisprudential

[63] European Society of Human Reproduction and Embryology, "ESHRE Supports the Position of ESHG on Embryo Selection Based on Polygenic Risk Scores" (European Society of Human Reproduction and Embryology, 2022).

[64] American Society for Reproductive Medicine Ethics Committee and American Society for Reproductive Medicine Practice Committee, "Use of Preimplantation Genetic Testing for Polygenic Disorders (PGT-P): An Ethics Committee Opinion," *Fertility and Sterility*, 2026, 24–30, https://doi.org/10.1016/j.fertnstert.2025.10.023.

[65] T Ishii, "Precautions for Polygenic Embryo Selection: Prohibition or Cautious Use," *Frontiers in Reproductive Health* 8 (2026), https://doi.org/10.3389/frph.2026.1771127.

maxims of intention, certainty, harm, necessity, and custom.[66] The relevant action is not simply testing DNA, but ranking embryos according to uncertain projections and contested social preferences. A stated intention to benefit a child cannot compensate for weak prediction, lack of necessity, or foreseeable harms associated with commodification and genetic hierarchy.

This finding refines Shabana's account of the treatment–enhancement boundary in Islamic discourse. Shabana shows that Islamic juristic reasoning does not produce a uniform distinction based solely on whether an intervention restores "normal" functioning.[67] Moral evaluation also depends on the procedure's nature, objective, consequences, and wider conception of human welfare. The present study extends this insight from genetic modification to embryo selection. It demonstrates that the therapy-enhancement distinction becomes even less stable when no embryo is treated, and the intervention instead changes which embryo is selected. In this setting, the ethical focus must shift from biological correction to the epistemology and governance of reproductive choice.

The principle of *al-umūr bi-maqāṣidihā* actions is evaluated according to their purposes remains relevant, but intention cannot serve as an independent source of justification. A clinic may describe multi-disease embryo ranking as preventive medicine, yet the legitimacy of that claim depends on whether the test can deliver clinically meaningful information. Purpose must therefore be examined together with evidentiary certainty, proportionality, necessity, and harm. Within a *maqāṣid*-oriented framework, *maṣlaḥah* cannot be established merely by identifying a statistically healthier embryo; it requires credible benefit, limited harm, fair procedures, and compatibility with the welfare and dignity of the future child.

This analysis also requires a broader interpretation of *ḥifẓ al-nasl*. Protection of progeny should not be reduced to preserving biological continuity or preventing the mixing of reproductive material. In genomic medicine, it includes responsible prevention of serious hereditary harm, secure handling of embryos, protection of the future child's welfare, and resistance to coercive standards of genetic acceptability. Such an interpretation can support preimplantation testing for a severe monogenic disorder while opposing selection based on weak probabilities or socially preferred characteristics. The principle is therefore neither intrinsically permissive nor intrinsically restrictive; its normative direction depends on the quality of evidence, seriousness of harm, and structure of reproductive responsibility.

Stakeholder evidence strengthens this interpretation by revealing a gap between theoretical reproductive choice and professional confidence. Shah surveyed 82 reproductive genetic counsellors and 54 reproductive endocrinology and infertility specialists in the United States. Eighty percent had heard of testing for polygenic disorders, and 52% answered "yes" or "maybe" when asked whether patients should have the option.[68] Only 18%, however, answered "yes" or "maybe" when asked whether they would recommend it. Reproductive specialists were more willing than genetic counsellors to consider recommending testing 28% compared

[66] Chin et al., "Islamic Perspectives on Polygenic Testing and Selection of IVF Embryos (PGT-P) for Optimal Intelligence and Other Non–Disease-Related Socially Desirable Traits."

[67] Shabana, "Between Treatment and Enhancement: Islamic Discourses on the Boundaries of Human Genetic Modification."

[68] S Shah et al., "Preimplantation Genetic Testing for Polygenic Disorders: Viewpoints of Reproductive Genetic Counselors and Reproductive Endocrinology and Infertility Specialists in the United States," *Journal of Genetic Counseling*, 2025, e70072, https://doi.org/10.1002/jgc4.70072.

with 12%. These findings demonstrate that support for patient access does not amount to confidence in clinical utility or endorsement as standard care.[69]

Qualitative studies reveal similar reservations. Siermann interviewed 31 healthcare professionals working in preimplantation genetic testing.[70] Most considered clinical implementation premature because of limited validity and utility, small numbers of available embryos, counselling difficulties, and the risk of creating anxiety and difficult reproductive decisions. Participants recognized possible health benefits and reproductive autonomy, but these considerations did not displace their concerns about evidentiary weakness and implementation.[71]

Further interviews with healthcare professionals identified concerns that polygenic screening could expand medicalization, stigmatize traits, intensify commercial influence, and create a technological imperative under which parents feel responsible for using every available form of prediction. These concerns are significant because they relocate coercion from explicit legal pressure to the architecture of clinical choice. Once risk scores become available, declining them may be represented as a failure of responsible parenting even when their practical value remains uncertain.[72]

Patients with direct experience of preimplantation testing also distinguish monogenic testing from polygenic ranking. Siermann conducted 18 interviews involving 28 Belgian participants who had undergone testing for monogenic disorders or structural chromosomal rearrangements.[73] Many described the existing procedure as physically, psychologically, and practically difficult and saw limited added value in obtaining polygenic scores. Participants worried that broader screening would create additional anxiety, responsibility, and complex choices. Most preferred any use to be restricted to serious familial disease and wanted healthcare professionals to retain an important role in selection decisions.

These stakeholder findings complicate accounts of reproductive autonomy that treat additional information as inherently empowering. More information may expand formal choice while reducing the conditions required for meaningful agency. When probabilities are difficult to interpret, commercial platforms rank several diseases simultaneously, and parents must choose among embryos with different estimated liabilities, information can become a burden rather than a resource. Autonomy therefore requires more than access to scores. It requires intelligibility, freedom from commercial pressure, realistic options, and the ability to decline testing without moral stigma.

The commercial context further destabilizes the therapy–enhancement boundary. Ginod and Dahan describe how commercial polygenic testing converts prospective parents into consumers and alters the physician's role from clinical adviser to intermediary in an embryo-ranking market.[74] Expansion from a limited

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[69] Shah et al.

[70] M Siermann et al., "Limitations, Concerns and Potential: Attitudes of Healthcare Professionals toward Preimplantation Genetic Testing Using Polygenic Risk Scores," *European Journal of Human Genetics* 31, no. 10 (2023): 1133–38, https://doi.org/10.1038/s41431-023-01333-9.

[71] Siermann et al.

[72] M Siermann et al., "Perspectives of Preimplantation Genetic Testing Patients in Belgium on the Ethics of Polygenic Embryo Screening," *Reproductive BioMedicine Online* 49, no. 3 (2024), https://doi.org/10.1016/j.rbmo.2024.104294.

[73] M Siermann et al., ""Are We Not Going Too Far?": Socio-Ethical Considerations of Preimplantation Genetic Testing Using Polygenic Risk Scores According to Healthcare Professionals," *Social Science and Medicine* 343 (2024), https://doi.org/10.1016/j.socscimed.2024.116599.

[74] P Ginod and M H Dahan, "Preimplantation Genetic Testing for Polygenetic Conditions: A Legal, Ethical, and Scientific Challenge," *Seminars in Reproductive Medicine* 42, no. 1 (2024): 60–68, https://doi.org/10.1055/s-0044-1782618.

set of disease risks toward broad genomic profiling blurs the boundaries among disease prevention, longevity, behavioural prediction, and enhancement. It may also deepen inequality, stigmatize persons not selected through testing, reduce acceptance of genetic diversity, and encourage choices based on desirable phenotypic or behavioural traits.

The equity problem is not secondary to the question of clinical validity. Polygenic scores have generally performed better in populations resembling the ancestry composition of the datasets from which they were developed. Turley and later reviews indicate that predicted benefits may be lower for couples from underrepresented populations, particularly those of African ancestry.[75] A market in which affluent families from well-represented populations receive the most informative scores would distribute both access and accuracy unequally. This is not merely an implementation defect; it affects whether the claimed public benefit can be established at all.

For Muslim societies, the issue is intensified by cross-border fertility care and uneven regulatory capacity. Polygenic reports, proprietary scoring systems, and genomic data can circulate digitally across jurisdictions even when embryo testing is restricted nationally. Siermann found that European regulatory models differ, yet all three models examined provided limited space for introducing polygenic embryo testing.[76] The comparison demonstrates that existing rules designed for monogenic testing do not automatically provide adequate governance for algorithmic multi-disease ranking.

Islamic bioethics must therefore examine the entire decision architecture rather than only the embryo or laboratory procedure. Relevant questions include which traits are included, how diseases are weighted, what ancestry data underlie the score, whether absolute or relative risk is presented, who owns the algorithm, how uncertainty is communicated, and which commercial incentives shape counselling. A technology-centred analysis asking only whether DNA has been modified overlooks the epistemic and institutional power exercised through classification.

This graduated model does not abandon the distinction between therapy and enhancement. It prevents the distinction from being treated as self-evident. The categories acquire normative force only when linked to disease seriousness, predictive validity, proportionality, future-child welfare, distributive justice, and institutional purpose. This interpretation extends *maqāṣid*-based reasoning by making the quality and governance of knowledge part of the ethical judgment itself.

The originality of this finding lies in relocating the debate from whether embryo selection modifies creation to how predictive systems construct reproductive value. For future-oriented Islamic and Islamicate studies, the key challenge is not simply producing a ruling on polygenic testing, but developing an Islamic governance of reproductive algorithms, genomic databases, commercial fertility markets, counselling practices, and transnational authority. Embryo selection may be conditionally defensible for severe monogenic disease, but present forms of polygenic disease ranking and non-medical trait selection lack the evidentiary, institutional, and normative foundations required for routine practice.

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[75] Turley et al., "Problems with Using Polygenic Scores to Select Embryos."

[76] Siermann et al., ""Are We Not Going Too Far?": Socio-Ethical Considerations of Preimplantation Genetic Testing Using Polygenic Risk Scores According to Healthcare Professionals."

Human Dignity, Lineage, and Intergenerational Responsibility in Reproductive Genomics

Comparative normative document analysis reveals that human dignity acquires practical value in reproductive genomics only when it is disaggregated into ontological, relational, institutional, and intergenerational obligations. Reading Islamic jurisprudential resolutions alongside international bioethical declarations, governance frameworks, and critical scholarship exposes functions of dignity that remain obscured when documents are examined within separate legal or intellectual traditions. The method shows that dignity does not operate as a single prohibition against altering the human genome. It functions variously as a claim about equal human worth, a standard governing kinship and reproductive responsibility, a basis for institutional rights, and a constraint on decisions whose consequences extend to future generations.

This analytical result arises from treating the documents not simply as repositories of ethical statements but as institutional interventions that classify technologies, distribute authority, and define legitimate forms of biomedical conduct. The comparative analysis identified normative segments concerning genetic characteristics, lineage, consent, confidentiality, discrimination, future persons, and regulatory responsibility. These segments were then interpreted through *karāmah*, *ḥifẓ al-nasl*, harm prevention, and intergenerational justice. This procedure prevents dignity from remaining an undefined rhetorical affirmation and instead asks what duties follow from it, who bears those duties, and which biomedical practices they constrain.

The first dimension, ontological dignity, concerns the equal worth of human beings irrespective of their genetic characteristics. Article 2 of UNESCO's *Universal Declaration on the Human Genome and Human Rights* affirms that every person has a right to respect for dignity and rights regardless of genetic characteristics. It further states that dignity makes it imperative not to reduce individuals to those characteristics and to respect their uniqueness and diversity. Article 3 rejects a genetically deterministic account of identity by recognizing that genomic potentialities are expressed differently according to natural and social environments, including health, living conditions, nutrition, and education.[77] The document therefore does more than protect genomic privacy; it rejects the epistemological assumption that DNA can provide a complete account of human identity or social value.

The document analysis clarifies why this non-reductionist principle matters for embryo selection and heritable editing. A genetic variant or polygenic score may provide information about probability, but it cannot establish the moral worth, identity, future achievement, or inevitable health status of the person who may develop from an embryo. Ontological dignity therefore constrains the transformation of genomic predictions into hierarchies of prospective lives. The objection is not that genetic information is intrinsically illegitimate, but that its predictive authority must not be extended beyond what the evidence can support or converted into a judgment that certain persons are less worthy of birth, care, or social inclusion.

This interpretation is consistent with Harris and Sulston's principle of genetic equity, according to which human beings are entitled to freedom from discrimination and equality of opportunity regardless of genetic information.[78]

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[77] United Nations Educational, "Universal Declaration on the Human Genome and Human Rights."

[78] J Harris and J Sulston, "Genetic Equity," *Nature Reviews Genetics* 5, no. 10 (2004): 796–800, https://doi.org/10.1038/nrg1454.

Their approach is analytically significant because it locates dignity not in the preservation of an untouched genome but in equality among persons whose genetic differences must not be used to restrict their ability to flourish. Human dignity thus does not require a categorical rejection of genetic intervention; it requires that intervention and genetic knowledge remain compatible with moral equality.

The same distinction appears in Chan's separation of dignity as an ideal moral status from dignity as an empirical or relational condition. Ideal dignity belongs to human beings irrespective of their capacities, health, or social recognition. Relational dignity concerns the ways in which persons are treated and positioned through social practices.[79] Genome editing may therefore leave intrinsic dignity conceptually intact while producing institutions that undermine lived dignity through stigma, exclusion, genetic ranking, or expectations of biological conformity. The comparative method extends Chan's distinction by demonstrating that relational injury can arise before a person exists, through reproductive classifications that express judgments about which traits and forms of life are considered acceptable.

Dignity also performs a juridical and political role. Martínez Bullé-Goyri (2013) describes human dignity as a foundation of human rights whose regulatory significance becomes especially important when scientific and technological transformations affect the beginning and end of life. Andorno similarly connects dignity with the preservation of human freedom in the face of emerging life-science technologies, including germline editing.[80] These arguments support the methodological decision to read dignity not merely as an individual moral property but as a principle structuring the legal and institutional conditions under which biotechnology is developed and used.

The second dimension, relational dignity, concerns kinship, care, reproductive responsibility, disability, and the social recognition of genetic difference. Comparative analysis makes this dimension especially visible because Islamic jurisprudential documents give lineage a degree of normative emphasis not usually found in secular governance frameworks. Resolution No. 203 of the International Islamic Fiqh Academy places restrictions on germ-cell interventions because of scientific uncertainty, possible harm, and consequences for progeny. It also regulates genetic testing, reproductive material, confidentiality, counselling, and professional responsibility.[81] Resolution No. 235 maintains the conditional permissibility of therapeutic genome editing but rejects mitochondrial replacement on the stated ground that it may produce confusion of kinship or lineage.[82]

These resolutions establish lineage as a central concern, but comparative document analysis also exposes an unresolved interpretive problem: lineage is not a single biological fact. It may refer to legal parenthood, the use of reproductive material originating from a married couple, inheritance, genealogical knowledge, social responsibility, gestational contribution, or continuity of nuclear genetic descent. Mitochondrial donation, gamete donation, embryo selection, heritable editing, and surrogacy do not affect these dimensions in identical ways. Treating every genetic contribution by a third party as the same form of lineage disruption

[79] D K Chan, "The Concept of Human Dignity in the Ethics of Genetic Research," *Bioethics* 29, no. 4 (2015): 274–82, https://doi.org/10.1111/bioe.12102.

[80] R Andorno, "Human Dignity, Life Sciences Technologies and the Renewed Imperative to Preserve Human Freedom," in *The Cambridge Handbook of Information Technology, Life Sciences and Human Rights*, 2022, 273–85, https://doi.org/10.1017/9781108775038.023.

[81] Academy, "Resolution No. 203 (9/21): Heredity, Genetic Engineering and the Human Genome."

[82] Academy, "Resolution No. 235 (6/24): The Human Genome and Future Bioengineering."

risks concealing the specific legal and relational consequences of different technologies.

The study therefore interprets *ḥifẓ al-nasl* more precisely as the protection of identifiable kinship, accountable parenthood, reproductive integrity, and the welfare of descendants. This interpretation does not equate progeny protection with preserving an entirely unmodified genome. Human genomes naturally undergo recombination and mutation, and many accepted medical interventions alter biological processes. The ethically relevant question is whether an intervention creates uncertainty about parental responsibility, compromises the integrity of reproductive procedures, imposes unjustifiable risks on descendants, or weakens the relationships of care through which a child's welfare is protected.

Smith's account of biomedical human rights reinforces the importance of genetic integrity but also illustrates why the concept must be used carefully. Smith situates the right to genetic integrity alongside dignity, autonomy, procreative liberty, and equitable access to health care.[83] Genetic integrity cannot plausibly mean immunity from every biomedical intervention, because therapeutic intervention may protect rather than violate a person's bodily and moral interests. It is better understood as protection against unauthorized, harmful, identity-reducing, or exploitative control over genetic characteristics. Within the present framework, genetic integrity supports lineage responsibility without turning biological non-intervention into an absolute norm.

Guyette's relational defence of dignity further illuminates this point. He argues that dignity cannot be reduced to autonomous choice because recognition of another person's worth first emerges within relationships such as family and care.[84] Applied to reproductive genomics, this insight challenges approaches that treat parental choice as ethically sufficient. Prospective parents exercise reproductive agency within obligations to the future child, family relationships, and society. Their decisions may be voluntary without necessarily being relationally responsible, particularly when they project restrictive ideals of normality or achievement onto the child.

The relational framework is also necessary for analyzing disability. Preventing a severe inherited condition may be motivated by concern for suffering and the future child's welfare. Yet generalized selection against disability may communicate that existing lives marked by similar conditions are less valuable. A dignity-based analysis must avoid two symmetrical errors: romanticizing disease in a manner that minimizes the burdens experienced by patients and families, and treating disability as sufficient evidence that a life is unworthy of existence. Condition severity, age of onset, available treatment, variability of lived experience, social accommodation, and the perspectives of affected communities must remain part of the ethical assessment.

This concern becomes clearer when the documents are read together with scholarship on eugenics and justice. Noormohamad and Alebouyeh argue that the transition from coercive to liberal eugenics does not eliminate injustice.[85] Even when genetic choices are formally voluntary, benefits may remain concentrated among privileged social groups, existing prejudices against disability may be reinforced, and reproductive selection may operate within already unequal

[83] J Smith, "Globalization of Peace," in *The Oxford Handbook of Peacebuilding, Statebuilding, and Peace Formation*, 2021, 314–27, https://doi.org/10.1093/oxfordhb/9780190904418.013.21.

[84] F Guyette, "Thomas Aquinas and Recent Questions about Human Dignity," *Diametros* 38 (2013): 113–27, https://doi.org/10.13153/diam.38.2013.540.

[85] N Noormohammad and A R Alebouyeh, "Moral Challenges of Liberal Eugenics Based on the Principle of Justice," *Journal of Philosophical Theological Research* 24, no. 1 (2022): 89–112, https://doi.org/10.22091/jptr.2021.6980.2545.

institutions. Tonkens similarly argues that genetic enhancement can become severely unjust when it amplifies existing inequalities, creates exclusionary conditions for participation, or disadvantages those who do not participate.[86] The problem is therefore not confined to state coercion; it includes market structures and social expectations capable of making genetic optimization functionally compulsory.

The third dimension, institutional dignity**,** translates moral status and relational responsibility into enforceable rights, procedures, and distributions of authority. This dimension emerges because the comparative method examines what the documents require institutions to do, rather than merely extracting their definitions of dignity. UNESCO requires prior risk–benefit assessment, free and informed consent, the right to decide whether to receive genetic information, independent review, confidentiality, protection from genetic discrimination, and access to the benefits of genetic progress.[87] The *Universal Declaration on Bioethics and Human Rights* further connects dignity with autonomy, privacy, equality, non-discrimination, social responsibility, benefit sharing, and protection of future generations.[88]

The International Islamic Fiqh Academy adopts related institutional protections through requirements concerning qualified specialists, confidentiality, non-directive counselling, secure management of reproductive materials, regulation, and prevention of exploitation.[89] The convergence is analytically important. Islamic and international documents do not derive their norms from identical intellectual genealogies, but both recognize that dignity cannot be preserved solely through individual moral intention. It requires competent institutions capable of controlling access, evidence, data, professional conduct, and commercial power.

This institutional dimension is increasingly important because genomic data are persistent, identifying, familial, and reusable. Information generated through reproductive testing may reveal facts about parents, siblings, and other relatives who did not directly consent to the procedure. It may also be stored, transferred, recombined with other datasets, or used for purposes not anticipated when it was collected. Institutional dignity therefore requires transparent rules concerning storage, secondary research, commercial transfer, cybersecurity, data deletion, algorithmic processing, and disclosure of familial findings. Consent at the point of sample collection is insufficient when the subsequent life of genomic data remains opaque.

Genetic discrimination illustrates why institutional protection cannot be replaced by appeals to intrinsic dignity alone. Harris and Sulston define genetic equity through freedom from discrimination and equal opportunities to flourish,[90] while Chan demonstrates how genetic reductionism can affect social recognition.[91] Genetic discrimination may arise in employment, insurance, health care, education, reproductive counselling, or informal social judgment. It may concern an actual diagnosis, an estimated future risk, or a family member's genetic result.

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[86] R Tonkens, "Enhancing Injustice: Justice and the Ethics of Human Genetic Enhancement," in *International Library of Bioethics*, vol. 113, 2025, 171–89, https://doi.org/10.1007/978-3-031-94690-5_9.

[87] United Nations Educational, "Declaration on the Responsibilities of the Present Generations towards Future Generations."

[88] United Nations Educational, "Universal Declaration on Bioethics and Human Rights."

[89] Academy, "Resolution No. 203 (9/21): Heredity, Genetic Engineering and the Human Genome."

[90] Harris and Sulston, "Genetic Equity."

[91] Chan, "The Concept of Human Dignity in the Ethics of Genetic Research."

Dignity must consequently be operationalized through rules governing how genetic classifications may be used, not merely through declarations that all persons remain equally valuable.

Contemporary genomic justice scholarship supports this conclusion. Tonkens identifies distributive exclusion and discriminatory enhancement as threats to moral equality.[92] Noormohamad and Alebouyeh show that liberal eugenics may reproduce injustice when access is unequally distributed and socially dominant groups determine desirable characteristics.[93] Segers and Mertes, however, caution against treating these concerns as sufficient grounds for an absolute prohibition of safe therapeutic heritable editing.[94] They argue that dignity should instead impose side constraints ensuring that value judgments embedded in genetic intervention do not diminish basic respect for persons possessing the traits being selected against. The present analysis supports this more differentiated position: dignity functions most effectively as an institutional constraint on purposes, practices, and distributions rather than as an automatic veto on technology.

The fourth dimension, intergenerational dignity**,** concerns duties owed to persons who may inherit the biological and social consequences of present reproductive decisions. Comparative analysis reveals that future generations appear in different normative forms across the documents: as bearers of interests, as recipients of inherited risk, as participants excluded from present consent, and as members of a future society shaped by today's classifications of health and normality. This multidimensional representation cannot be captured by an autonomy model focused exclusively on the prospective parents.

UNESCO's *Declaration on the Responsibilities of the Present Generations towards Future Generations* states that present generations must safeguard the needs and interests of future generations, consider the consequences of major scientific projects, protect the human genome, and avoid compromising the preservation of humankind and other species.[95] framework does not specify a complete policy for heritable editing, but it establishes that technological decisions affecting inheritance are not exhausted by the consent of currently living actors.

WHO similarly treats heritable genome editing as an issue of public and transnational governance rather than a private reproductive procedure. Its framework links scientific oversight with institutional accountability, public engagement, research registration, international cooperation, and attention to long-term social consequences.[96] The ISSCR adds that any future regulatory framework would require robust multigenerational follow-up, protection of family confidentiality, discussion of alternatives, and explicit consideration of the risks and benefits inherited by later generations. It also calls for prevention of premature clinical use until safety, ethical, and societal issues have been resolved.[97]

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[92] Tonkens, "Enhancing Injustice: Justice and the Ethics of Human Genetic Enhancement."

[93] Noormohammad and Alebouyeh, "Moral Challenges of Liberal Eugenics Based on the Principle of Justice."

[94] S Segers and H Mertes, "Does Human Genome Editing Reinforce or Violate Human Dignity?," *Bioethics* 34, no. 1 (2020): 33–40, https://doi.org/10.1111/bioe.12607.

[95] United Nations Educational, "Universal Declaration on the Human Genome and Human Rights."

[96] Organization, "Violence against Women Prevalence Estimates, 2018: Global, Regional and National Prevalence Estimates for Intimate Partner Violence against Women and Global and Regional Prevalence Estimates for Non-Partner Sexual Violence against Women"; Organization, "Human Genome Editing: A Framework for Governance."

[97] Research, "Guidelines for Stem Cell Research and Clinical Translation."

The document analysis shows that the absence of consent from future persons should be interpreted as a reason for heightened justification, not as a self-sufficient prohibition. Present actors routinely make decisions that affect children who cannot consent, but the legitimacy of such decisions depends on a fiduciary orientation toward the child's welfare. Heritable editing would therefore require a serious medical purpose, strong evidence, absence of less burdensome alternatives, limited and intelligible risks, and safeguards against the imposition of socially preferred characteristics. The threshold should rise with the intervention's uncertainty, irreversibility, transmissibility, and distance from therapeutic necessity.

Segers and Mertes sharpen this interpretation by showing that dignity arguments can support both opposition to and qualified acceptance of heritable editing.[98] Editing may threaten dignity when it intensifies eugenic judgment, inequality, or disrespect toward people with particular traits. It may also be defended as dignity-enhancing if it safely prevents grave suffering. Their conclusion that dignity should operate through equality-based side constraints rather than an automatic prohibition supports the four-dimensional framework developed here.

Lima similarly places intergenerational justice within a wider obligation to preserve the conditions including genetic heritage and the broader environment—upon which the dignity and welfare of future generations depend.[99] This perspective is important because it prevents intergenerational responsibility from being reduced to the biological safety of a single edited embryo. The relevant inheritance also includes regulatory systems, social inequalities, cultural understandings of disability, and ecological conditions transmitted across generations.

The analysis therefore distinguishes biological inheritance from normative inheritance**.** Biological inheritance concerns intended edits, off-target changes, and effects transmitted through reproduction. Normative inheritance concerns the social standards institutionalized through reproductive technology: which conditions are categorized as intolerable, which traits are rewarded, and which forms of human variation remain publicly supported. Future persons may inherit not only altered genomes but also institutions structured around genetic ranking and expectations of optimization.

The four-dimensional model addresses a limitation in both dignity-based and autonomy-based bioethics. An exclusively ontological account is too general to resolve concrete disputes because supporters and opponents of genome editing can each claim to defend intrinsic human worth. An exclusively autonomy-based account is also insufficient because prospective parental choice does not encompass the interests of future persons, the social meaning of disability, the distribution of access, or the conduct of commercial and regulatory institutions. The proposed framework retains equal human worthwhile specifying the relationships, rights, and future-oriented duties through which that worth must be protected.

The method also explains why dignity does not entail preserving biological nature in an untouched form. Therapeutic intervention may affirm dignity when it relieves severe suffering and expands a person's ability to participate in social life. Conversely, a non-invasive act of embryo ranking may undermine dignity when it reduces prospective persons to preferred genetic profiles. The ethically

[98] Segers and Mertes, "Does Human Genome Editing Reinforce or Violate Human Dignity?"

[99] R A Lima, Á A A Magalhães, and I A G Cedro, "The Law Of Future Generations To The Environment From An Ethical-Legal Perspective," *Revista Juridica* 4, no. 76 (2023): 199–219, https://doi.org/10.26668/revistajur.2316-753X.v4i76.4998.

decisive distinction is not intervention versus non-intervention, but the relationship among purpose, evidence, social meaning, institutional structure, and distributive consequences.

The comparative approach has three principal strengths. First, it makes the distinctive contribution of Islamic concepts visible without isolating them from international bioethics. *Karāmah* and *ḥifẓ al-nasl* introduce questions of honour, kinship, and reproductive accountability, while UNESCO, WHO, and ISSCR supply more developed language concerning rights, institutional governance, and multigenerational oversight. Second, the method identifies functional convergence without claiming conceptual identity. Lineage protection is not simply another term for privacy, and intergenerational justice is not reducible to *ḥifẓ al-nasl*, but the concepts can illuminate overlapping dimensions of responsibility. Third, comparative analysis reveals silence and ambiguity within authoritative documents, particularly the insufficient differentiation of genetic, gestational, legal, and social forms of parenthood.

The method also has limits. Institutional documents articulate official norms but do not demonstrate how those norms are interpreted in clinical practice or experienced by patients, families, disability communities, and religious publics. The analysis cannot determine the prevalence of particular views among Muslims or establish a single Islamic position. Nor can normative comparison resolve every disagreement concerning embryo status, parenthood, or the acceptable threshold of genetic risk. These questions require subsequent empirical research involving clinicians, jurists, patients, disability advocates, fertility providers, and regulators across diverse Muslim societies.

Despite these limits, the approach is particularly relevant to *Islamicate Futures* because it shows how emerging reproductive technologies transform Islamic knowledge and authority. Genome editing is not merely a new object awaiting a conventional legal ruling. It requires religious reasoning to engage with genetic probabilities, data infrastructures, reproductive markets, international regulation, and consequences extending beyond currently living communities. Jurists, scientists, clinicians, data experts, patients, and affected publics possess different forms of knowledge that must be coordinated without collapsing normative authority into technical expertise.

The distinctive contribution of the analysis is therefore to reconstruct *karāmah* as an operational framework rather than a rhetorical assertion. Human dignity guides reproductive genomics only when intrinsic human worth is connected to accountable kinship, protection against discrimination, governance of genomic institutions, and responsibility for the biological and normative worlds inherited by future generations. This methodological and theoretical synthesis advances future-oriented Islamic and Islamicate studies by shifting analysis from abstract declarations of dignity toward the institutions, relationships, and intergenerational obligations through which dignity is either protected or undermined.

From Permissibility-Centred Fatwas to Dignity-Based Islamic Bioethical Governance

The principal theoretical implication of this study is that Islamic bioethics must move from treating permissibility as the final product of ethical reasoning toward understanding governance as a continuous process through which normative principles, biomedical evidence, institutional authority, and social consequences are repeatedly assessed. Fatwas remain indispensable sources of religious guidance, but a binary ruling of permissible or prohibited cannot by itself

regulate technologies whose evidentiary status, clinical applications, commercial infrastructures, and social effects change over time. Heritable genome editing and embryo selection therefore expose not a failure of Islamic jurisprudence, but the inadequacy of an episodic regulatory model for governing dynamic biomedical systems.

This shift builds on a longstanding methodological debate within Islamic bioethics. Earlier applied studies demonstrated that biomedical deliberation depends on interactions between physicians and Islamic scholars but also revealed persistent epistemic gaps between the two groups. In their analysis of deliberations on brain death, Padela, Shanawani, and Arozullah showed that medical experts and jurists may employ different concepts, standards of evidence, and disciplinary assumptions even when participating in the same ethical discussion.[100] Padela subsequently located Islamic bioethics at the intersection of sacred law, lived experience, professional practice, and state authority, thereby rejecting the assumption that bioethical norms emerge from jurisprudential texts alone.[101] These studies established the multidisciplinary character of the field, but the technologies examined were generally treated as identifiable clinical practices to which a ruling could be attached. Reproductive genomics complicates that model because the ethical object may be a changing algorithm, a proprietary risk score, an evolving clinical protocol, or a dataset whose predictive value varies across populations.

The interdisciplinary orientation developed further through scholarship that presented Islamic bioethics as a constructive dialogue among religious scholars, clinicians, scientists, ethicists, and policymakers. Bagheri and Al-Ali's edited volume emphasizes the diversity of methods and institutional settings through which Muslim societies confront biomedical innovation, while its contributors identify infrastructure, professional capacity, and engagement with global bioethics as central challenges for the field.[102] Amin similarly argue that Islamic bioethics should function educationally, providing scientists, regulators, students, and wider publics with a structured vocabulary for evaluating genetics and biotechnology.[103] The present study extends this multidisciplinary orientation by arguing that dialogue must be institutionalized within an ongoing governance cycle rather than convened only when a new fatwa is requested.

The primary Islamic documents already contain elements of such a governance orientation. Resolution No. 203 of the International Islamic Fiqh Academy does more than classify genetic interventions. It calls for specialized institutions, competent professionals, confidentiality protections, non-directive counselling, secure handling of reproductive materials, measures against exploitation, public education, and assistance for those unable to bear the costs of genetic services. Resolution No. 235 similarly conditions genome editing on scientifically recognized safety and effectiveness and requires stringent regulatory procedures to preserve dignity and prevent misuse.[104] Governance is therefore not

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[100] A M Arozullah and M A Kholwadia, "Wilāyah (Authority and Governance) and Its Implications for Islamic Bioethics: A Sunni Māturīdi Perspective," *Theoretical Medicine and Bioethics* 34, no. 2 (2013): 95–104, https://doi.org/10.1007/s11017-013-9247-3.

[101] Padela, "Islamic Bioethics: Between Sacred Law, Lived Experiences, and State Authority."

[102] K Alali, G I Serour, and A Bagheri, "Challenges in Islamic Bioethics," in *Islamic Bioethics: Current Issues and Challenges* (World Scientific, 2018), 229–42.

[103] L Amin et al., "Educating the Ummah by Introducing Islamic Bioethics in Genetics and Modern Biotechnology," in *Procedia - Social and Behavioral Sciences*, vol. 15, 2011, 3399–3403, https://doi.org/10.1016/j.sbspro.2011.04.308.

[104] Academy, "Resolution No. 203 (9/21): Heredity, Genetic Engineering and the Human Genome"; Academy, "Resolution No. 235 (6/24): The Human Genome and Future Bioengineering."

an external administrative addition to Islamic jurisprudence. It can be derived from the protection of life, progeny, dignity, property, and public welfare.

Nevertheless, these resolutions operate primarily at the level of general principles and technological categories. They do not specify how an institution should audit ancestry bias in polygenic prediction, compare relative and absolute risk, evaluate proprietary algorithms, govern the secondary use of genomic data, monitor delayed adverse events, or revise a ruling when an application changes. This limitation should not be interpreted as a defect unique to Islamic institutions. Normative declarations ordinarily establish boundaries and principles rather than complete regulatory systems. The problem arises when those declarations are treated as sufficient for technologies whose moral status depends on continuously changing evidence.

The WHO framework demonstrates the procedural requirements of a more developed governance model. It connects ethical values to institutions, regulatory processes, research registries, publication standards, professional responsibility, international coordination, public engagement, intellectual-property questions, medical travel, and mechanisms for responding to illegal or unethical activity. Governance is distributed among researchers, clinical institutions, professional organizations, national regulators, and international bodies rather than assigned to a single authoritative actor.[105] The ISSCR adopts a related approach by distinguishing activities that are permitted, restricted, or currently impermissible and by linking future clinical translation to evidence, independent review, public legitimacy, long-term monitoring, and regulatory capacity.[106]

Islamic bioethics should engage these international models critically rather than reproduce them as normatively neutral templates. WHO and ISSCR offer procedural sophistication, but their frameworks do not fully resolve Islamic questions concerning lineage, the moral structure of reproduction, juristic authority, or the relationship between individual choice and communal welfare. Conversely, Islamic jurisprudence provides substantive concepts *karāmah*, *ḥifẓ al-nafs*, *ḥifẓ al-nasl*, *maṣlaḥah*, necessity, and harm prevention but does not automatically specify the institutional procedures through which these concepts should govern genomic medicine. The theoretical task is therefore to connect Islamic normative substance with contemporary regulatory capacity without subordinating either domain to the other.

This connection also responds to debate over the use of *maqāṣid al-sharīʿah* in bioethics. Ibrahim propose a comprehensive model in which the objectives of Islamic law provide moral ends, while jurisprudential maxims assist deliberation about intention, method, and outcome.[107] The model is valuable because it moves beyond isolated textual citation and supplies a structured framework for ethical reasoning. Padela, however, identifies conceptual and practical problems: the hierarchy among objectives may remain unclear, the authority to define and apply them may be disputed, and broad objectives can generate contradictory conclusions without operational criteria.[108] Protection of life may justify therapeutic

[105] Organization, "Violence against Women Prevalence Estimates, 2018: Global, Regional and National Prevalence Estimates for Intimate Partner Violence against Women and Global and Regional Prevalence Estimates for Non-Partner Sexual Violence against Women"; Organization, "Violence Against Women Prevalence Estimates."

[106] Research, "Guidelines for Stem Cell Research and Clinical Translation."

[107] A H Ibrahim et al., "Maqasid Al-Shariah Based Islamic Bioethics: A Comprehensive Approach," *Journal of Bioethical Inquiry* 16, no. 3 (2019): 333–45, https://doi.org/10.1007/s11673-019-09902-8.

[108] Padela, "Using the Maqāṣid Al-Sharīʿah to Furnish an Islamic Bioethics: Conceptual and Practical Issues."

intervention, protection of progeny may justify caution, and public welfare may be invoked both to accelerate innovation and to restrict it.

The present findings support both positions while extending them. *Maqāṣid* provide indispensable normative orientation, but they require an explicit decision structure that determines what evidence is relevant, how competing objectives are weighed, which actors participate, and when a prior judgment must be reconsidered. The proposed governance framework does not replace *maqāṣid*-based analysis; it supplies the institutional and procedural architecture through which such analysis can become accountable. It therefore converts *maqāṣid* from a list of desirable ends into a set of evaluative responsibilities distributed across the life cycle of a technology.

This procedural expansion also answers recent critiques of Islamic bioethics as excessively legalistic. Hashmi argues that representations of Islamic bioethics often lack conceptual clarity and reduce a diverse, contested tradition to majoritarian or state-authorized rulings.[109] Such reduction privileges particular institutions while marginalizing reformist, dissenting, minority, or contextually grounded voices. Muaygil makes a related criticism, contending that strict application of Islamic law without deeper moral analysis can produce recommendations unsupported by a sufficiently developed account of dignity, personhood, autonomy, justice, or social context.[110] She calls for renewed philosophical engagement and interdisciplinary collaboration rather than an exclusive focus on extracting rulings.

A dignity-based governance model addresses these critiques by distinguishing religious normativity from institutional closure. Jurists retain a specific interpretive role, but the ethical process must disclose the moral values underlying a ruling, the empirical assumptions on which it relies, the disagreements it contains, and the social groups affected by it. The model therefore rejects two extremes: a technocratic system in which scientists define ethical legitimacy through clinical evidence alone, and a juridical system in which scientific and social knowledge is consulted only after the normative conclusion has effectively been reached.

The proposed Dignity-Based Islamic Governance Framework for Reproductive Genomics consists of six substantive gates followed by monitoring and periodic normative review. The gates are not numerical variables whose scores can be aggregated into an automatic decision. They operate as threshold questions. Failure at a foundational gate such as absence of scientific validity, use for a non-medical optimization goal, unacceptable intergenerational risk, or serious violation of reproductive integrity may be sufficient to deny clinical authorization even when other criteria are satisfied.

The first gate locates therapeutic purpose within a spectrum rather than a binary classification. A severe, highly penetrant childhood disorder provides a stronger justification for intervention than a small reduction in the probability of a treatable, adult-onset multifactorial condition. The assessment should include mortality, morbidity, penetrance, age of onset, available treatment, expected suffering, and the effect of the condition on ordinary functioning. This gate retains the treatment–enhancement distinction but prevents medical terminology from substituting for ethical analysis.

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[109] J T Hashmi, "Overcoming Religious Illiteracy: Towards a More Inclusive Approach to Islamic Bioethics," *Journal of Islamic Ethics* 34, no. 2 (2021), https://doi.org/10.1163/24685542-12340063.

[110] R Muaygil, "Of Muftis and Morals: Reviving Philosophical Discourse in Islamic Bioethics," *Developing World Bioethics*, 2026, https://doi.org/10.1111/dewb.70035.

The second gate requires scientific validity and whole-pathway proportionality. Its function is to prevent therapeutic intention from compensating for inadequate evidence. For somatic editing, the assessment includes editing accuracy, conditioning toxicity, cell-processing quality, fertility effects, durability, and long-term follow-up. For embryo selection, it includes predictive validity, ancestry transferability, absolute rather than merely relative risk reduction, pleiotropy, and the realistic number of embryos available. This gate operationalizes the Islamic principles of certainty and harm prevention by making the evidentiary structure of a technology part of its moral evaluation.

The third gate concerns reproductive and lineage integrity. It requires secure identification and handling of gametes and embryos, traceable laboratory procedures, protection against sample mixing, and clarity regarding legal and social parenthood. It also refines *ḥifẓ al-nasl* by distinguishing among genetic contribution, gestation, legal affiliation, inheritance, and parental responsibility. Lineage should not be invoked as an undifferentiated prohibition whenever technology changes reproductive biology. The ethical task is to identify which relationship or responsibility is affected and why that effect is normatively significant.

The fourth gate protects reproductive agency from both informational failure and social coercion. Meaningful consent must include scientific uncertainty, expected benefit, procedural burden, available alternatives, data uses, and the possibility that the predicted result will not occur. It must also account for subtler pressures generated by clinics, commercial advertising, families, insurers, or states. A signed consent form is not sufficient when risk is presented misleadingly or when parents are led to believe that declining an uncertain technology constitutes irresponsible reproduction.

The fifth gate introduces a heightened threshold for heritable interventions. Because biological consequences may extend beyond the first child, serious therapeutic purpose, robust preclinical evidence, absence of a less harmful reasonable alternative, independent oversight, and long-term monitoring become necessary conditions. This gate does not treat the inability of future persons to consent as an automatic prohibition. It interprets that inability as establishing a stronger fiduciary duty for present decision-makers and a stricter burden of justification.

The sixth gate makes justice internal to ethical authorization rather than a secondary question of implementation. UNESCO links biomedical progress with equality, social responsibility, equitable access, non-discrimination, and benefit sharing.[111] The International Islamic Fiqh Academy similarly requires protection against exploitation and calls for assistance to those who cannot afford genetic services.[112] A technology is not ethically successful merely because it produces benefit for individuals able to purchase it. Its development and distribution must also be assessed in relation to the communities that provide research participation, genomic data, public infrastructure, and clinical risk.

The final stage introduces the article's concept of regulatory *ijtihād*. The term refers here to a structured, recurring process through which Islamic ethical judgments are reconsidered in response to new biomedical evidence, technological applications, and social consequences. It differs from issuing another fatwa only after a controversy has occurred. Regulatory *ijtihād* requires standing

[111] United Nations Educational, "Universal Declaration on the Human Genome and Human Rights"; United Nations Educational, "Universal Declaration on Bioethics and Human Rights."

[112] Academy, "Resolution No. 203 (9/21): Heredity, Genetic Engineering and the Human Genome."

multidisciplinary institutions, access to clinical and genomic evidence, predetermined review intervals, public explanation, and the capacity to distinguish between changes in scientific facts and changes in normative interpretation.

This concept revises conventional assumptions about religious authority without displacing juristic expertise. Arozullah and Kholwadia show that *wilāyah* links forms of authority to corresponding levels of responsibility and enforceability.[113] Their account is particularly relevant in settings where juridical councils issue guidance without possessing political authority to regulate medical institutions directly. A fatwa may guide conscience and professional conduct, but it does not automatically license a clinic, govern a genomic database, compel adverse-event reporting, or prohibit misleading advertising. These tasks belong to different institutional authorities and require coordination among religious, scientific, professional, and political structures.

Regulatory *ijtihād* therefore distinguishes normative authority from regulatory competence**.** Jurists determine how Islamic sources and ethical principles bear on a biomedical question. Scientists and clinicians establish what a technology does, what evidence supports it, and what uncertainties remain. Regulators assess institutional capacity, enforce standards, and monitor outcomes. Patients and affected communities contribute knowledge about lived burdens, trust, disability, access, and social consequences. Data scientists clarify algorithmic architecture and population bias. No group can assume the epistemic responsibilities of all the others.

This differentiated authority model also responds to Hashmi's concern that "Islamic bioethics" can be presented as a singular and uncontested discourse. Regulatory deliberation must identify whether a position represents a particular school, national institution, transnational academy, philosophical tradition, or policy regime. It should also preserve documented disagreement rather than forcing premature consensus. This is especially important because Muslim societies differ in jurisprudential traditions, legal systems, political institutions, health-care capacity, socioeconomic conditions, and relationships between religion and the state.

Pluralism does not preclude common minimum standards. Scientific validity, prevention of grave harm, informed consent, confidentiality, non-discrimination, reproductive integrity, transparency, and prohibition of deceptive commercial claims can function across jurisdictions even where institutions disagree about embryo status, mitochondrial donation, or specific applications of germline technology. The proposed framework thus combines normative pluralism with procedural consistency.

The framework also extends Islamic bioethics into public policy. Bagheri's account of bioethical institutionalization in Iran demonstrates that Islamic ethical reasoning can shape national research codes, patient-rights instruments, educational programs, and bioethics committees rather than remaining confined to personal religious guidance.[114] More broadly, Bagheri and Al-Ali and Alali identify infrastructure and capacity building as central to the future of Islamic bioethics.[115] The present study specifies what such capacity would require in reproductive genomics: specialized scientific review, genomic-data governance,

[113] Arozullah and Kholwadia, "Wilāyah (Authority and Governance) and Its Implications for Islamic Bioethics: A Sunni Māturīdi Perspective."

[114] A Bagheri, "Iran, Islamic Republic Of," in *Handbook of Global Bioethics*, 2014, 1213–27, https://doi.org/10.1007/978-94-007-2512-6_29.

[115] Alali, Serour, and Bagheri, "Challenges in Islamic Bioethics."

counselling standards, registry systems, regulatory enforcement, and sustained juristic engagement.

Genomic justice constitutes a particularly important public-policy dimension. Access to gene therapies and assisted reproduction is affected by cost, specialized infrastructure, geographic concentration, and the representation of populations in genomic research. The framework therefore interprets justice at three levels: access to clinically beneficial interventions, fair distribution of research burdens and benefits, and equitable accuracy of genomic prediction. A risk score that performs substantially better for one ancestry group than another is not merely technically incomplete; its unequal validity affects the ethical justification for clinical use.

The educational implications are equally significant. Amin frame Islamic bioethics as a platform for educating scientists, regulators, students, and the public about biotechnology.[116] The present findings refine that proposal by showing that education must extend beyond teaching whether an intervention is halal or haram. Genomic literacy should include probability, penetrance, absolute and relative risk, algorithmic bias, data reuse, research uncertainty, and the social implications of genetic classification. Religious literacy is also required so that clinicians and policymakers do not treat Islamic ethics as a uniform set of prohibitions.

Digital transformation makes this broader literacy unavoidable. Reproductive genomics increasingly depends on cloud-based databases, proprietary algorithms, online reporting platforms, and services delivered across borders. The object of ethical judgment may therefore change without a corresponding change in the formal name of the service. A clinic may add traits to an embryo-ranking panel, retrain its algorithm on a new dataset, or alter the weighting of diseases while continuing to market the same product. A one-time ruling cannot govern such changes unless it is connected to auditability, data transparency, and periodic review.

This digital dimension also changes the scale of religious authority. Advice about reproductive technologies may circulate through online fatwa portals, institutional websites, social media, and transnational professional networks before national regulatory bodies have reached a position. The relevant question is no longer simply which scholar issues the ruling, but how the ruling travels, which technical description it relies upon, how users interpret it, and whether commercial providers invoke it as evidence of legitimacy. Dignity-based governance therefore requires scrutiny of the infrastructures through which Islamic ethical authority is produced and mobilized.

The proposed model also contributes to sustainability understood as institutional durability rather than merely environmental preservation. Responsible governance must remain functional beyond the initial authorization of a technology. Registries require long-term funding; genomic data require continuing security; counselling standards must adapt to new evidence; and monitoring must persist after commercial incentives shift elsewhere. A governance system that permits innovation but cannot maintain surveillance, public accountability, or equitable access is not ethically sustainable.

Methodologically, the model synthesizes three levels of analysis that are often separated. Biomedical evidence establishes what a technology can presently achieve and what uncertainties remain. Normative analysis identifies values,

[116] L Amin et al., "Educating the Ummah by Introducing Islamic Bioethics in Genetics and Modern Biotechnology," *Procedia—Social and Behavioral Sciences*, 2011, 3399–3403, https://doi.org/10.1016/j.sbspro.2011.04.308.

duties, and limits. Institutional analysis determines who must act, through which procedures, with what evidence, and under what forms of accountability. Scientific evidence alone cannot determine moral legitimacy, while ethical principles alone cannot establish clinical validity or regulatory feasibility.

It treats Islamic bioethics as a site of knowledge production rather than a reactive mechanism for approving or rejecting technologies developed elsewhere. Islamic concepts shape the purposes, social organization, and distributive conditions of innovation. Second, it examines how biomedical technologies reorganize religious authority by requiring sustained collaboration among jurists, scientists, regulators, and publics. Third, it links ethical reasoning to Muslim social change by examining how genomic medicine may transform family responsibility, disability norms, inequality, and expectations of reproductive conduct.

The broader contribution extends beyond genome editing. The governance logic is relevant to medical artificial intelligence, digital health, neurotechnology, biobanking, synthetic biology, and other fields in which the object of ethical judgment changes through software updates, new datasets, commercial expansion, or evolving evidence. In each case, a ruling attached to a stable technological label may be inadequate. Islamic ethics requires institutions capable of tracing how purpose, method, risk, and social consequence change over time.

The study therefore revises the question at the centre of Islamic bioethical deliberation. The issue is no longer simply whether a technology is permissible. It is whether the technology reduces suffering without creating genetic hierarchy; preserves reproductive responsibility without enabling coercion; protects lineage without obstructing legitimate treatment; distributes benefits without reproducing structural inequality; and respects future generations as bearers of dignity rather than objects of present optimization.

Islamic bioethics must consequently develop from a permissibility-centred model into a continuous system of dignity-based governance. The originality of this framework lies in joining Islamic normative reasoning to evidence assessment, differentiated authority, digital regulation, distributive justice, and periodic regulatory *ijtihād*. It thereby positions Islamic knowledge traditions not at the margins of biomedical governance, but as critical participants in determining how emerging technologies should be authorized, monitored, revised, and, when necessary, refused.

CONCLUSION

This study examined how Islamic bioethics can govern heritable genome editing and embryo selection beyond a narrow focus on permissibility. It analyzed the meaning of human dignity, compared Islamic ethical principles with international bioethical frameworks, and developed an integrated model for distinguishing legitimate therapeutic and preventive uses from enhancement, discriminatory selection, reproductive commodification, and eugenic practices. The findings show that therapeutic genome editing is ethically defensible only when the benefits of the entire treatment pathway outweigh its risks. Clinical efficacy alone is insufficient; conditioning toxicity, long-term uncertainty, informed consent, institutional competence, available alternatives, and equitable access must also be considered. In this context, *ḥifẓ al-nafs* supports the relief of serious suffering but does not automatically justify every medically framed intervention.

The study also demonstrates that the therapy–enhancement boundary is unstable in embryo selection. Testing for severe and highly penetrant monogenic disease has a stronger justification than polygenic ranking for common disorders

or non-medical traits. The ethical issue lies not only in modifying DNA, but also in how embryos are classified, risks are communicated, and desirable human traits are socially defined.

The article's main theoretical contribution is the reconstruction of human dignity as an operational principle with ontological, relational, institutional, and intergenerational dimensions. This framework protects equal human worth, responsible kinship, informed agency, non-discrimination, data protection, equitable access, and the interests of future generations.

These findings support a shift from permissibility-centred fatwas toward dignity-based Islamic bioethical governance. The proposed model integrates therapeutic purpose, scientific validity, proportionality, lineage integrity, reproductive agency, intergenerational responsibility, and distributive justice. It also requires continuous regulatory *ijtihād* involving jurists, scientists, clinicians, regulators, patients, and affected communities. Future research should test this framework through comparative policy studies, institutional case studies, and empirical research in diverse Muslim societies. The article ultimately positions Islamic bioethics as an active framework for governing biomedical futures rather than merely classifying emerging technologies as permissible or prohibited.

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