

# ASSESSING THE PRECISION AND IMPACT OF GENETIC COUNSELING IN DETECTING INHERITED CONDITIONS AMONG NEWLY WEDDED COUPLES: IMPLICATIONS FOR REPRODUCTIVE HEALTH AND STRATEGIC FAMILY PLANNING - A CASE STUDY OF JAPAN

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**Abstract:** This study comprehensively evaluates the accuracy and impact of genetic counseling in the context of identifying hereditary diseases among newly married couples, with an emphasis on its implications for reproductive health and strategic planning of the family. The increasing prevalence of genetic disorders worldwide requires proactive interventions to mitigate the associated risks, and genetic counseling has become a crucial tool in this regard. By providing early detection and personalized counseling, genetic counseling provides couples with essential knowledge to make informed reproductive choices, thereby improving family planning strategies and reducing the incidence of hereditary diseases.

The research aims to examine the accuracy and reliability of genetic counseling procedures in the detection of genetic predispositions. She delves deeper into the psychological and social ramifications of this advice, considering how it affects couples' perceptions, emotional well-being and preparation for parenthood. In addition, the study assesses how genetic counseling promotes informed decision-making and autonomy in reproductive planning, highlighting its role in addressing immediate and long-term health outcomes.

Methodologically, the study adopts a mixed-methods approach to provide a comprehensive understanding of the topic. Quantitative analyses focus on assessing diagnostic accuracy, including the sensitivity and specificity of genetic tests, while qualitative methods explore the lived experiences and perceptions of couples receiving counseling. This dual approach not only provides a robust assessment of counseling effectiveness, but also highlights the nuanced social and ethical dimensions of genetic counseling.

The results of this research are intended to inform the development of more effective and context-specific genetic counseling frameworks. These frameworks aim to optimize service delivery, address gaps in health policy, and improve access for diverse populations. In addition, the study highlights the importance of integrating genetic counseling into broader public health strategies, advocating for its role in promoting healthy families, reducing the burden of inherited disease, and improving reproductive health outcomes at the systemic level. By addressing the interactions between genetic counseling, health systems, and family planning, the research aims to make a substantial contribution to the fields of public health, medical genetics, and health policy.

The study also explores the potential role of expanding genetic counseling services as a strategic tool for promoting public health. Improving access to genetic counseling, particularly for newly married couples, may reduce the prevalence of hereditary diseases, reduce the incidence of preventable genetic disorders, and contribute to more informed and healthier family planning decisions for generations. The research also provides recommendations for policy adjustments to make genetic counseling more accessible and effective, especially in light of Japan's demographic challenges, such as low fertility rates and an aging population. Ultimately, this study aims to contribute to a more comprehensive understanding of the impact of genetic counseling on reproductive health and family planning in Japan, providing a model for other countries to follow in addressing the problem of hereditary diseases in the context of modern health care.

**Keywords:** Genetic counseling; Inherited conditions; Reproductive health; Family planning & diagnostic accuracy

## 1 INTRODUCTION

The increasing prevalence of genetic disorders represents a growing challenge for global health, with an estimate that 5–10% of all diseases worldwide have a genetic component [1]. This burden highlights the urgent need for proactive and innovative health approaches to reduce the incidence and mitigate the impact of hereditary diseases. Genetic counseling has become an essential service in this context, providing personalized risk assessments, education, and psychosocial support to individuals and families at risk for genetic disorders. This service equips individuals with the knowledge needed to make informed decisions about their reproductive health and family planning, thus playing a vital role in addressing the broader implications of genetic health for society [2].

Among newly married couples, genetic counseling plays a particularly important role. These couples often have to make reproductive decisions that shape the genetic health of future generations. Early identification of potential genetic risks through counseling offers couples a unique opportunity to plan healthy pregnancies and mitigate the transmission of genetic diseases to their children. In addition, genetic counseling facilitates informed and responsible family planning, offering options such as preimplantation genetic testing, prenatal diagnosis, or alternative reproductive strategies [3]. This dual purpose highlights the value of genetic counseling not only to promote individual well-being, but also to contribute to reducing the prevalence of genetic diseases at the population level.

This research examines the impact of genetic counseling on the detection of inherited diseases in newly married couples, highlighting its implications for reproductive health and strategic family planning. Genetic counseling for this demographic is particularly critical because decisions made at this stage of life have profound consequences for the health of the family and the broader health system. Evidence suggests that access to genetic counseling improves reproductive outcomes, strengthens genetic literacy, and promotes a sense of empowerment among couples, allowing them to make decisions that align with their personal values and family goals [4]. It also addresses the psychosocial challenges associated with genetic risk, providing emotional support, and reducing anxiety in couples facing uncertain outcomes [5].

The growing integration of genetic counseling into public health strategies highlights its transformative potential. By identifying at-risk populations and providing appropriate interventions, genetic counseling can help reduce the economic and social burden of inherited diseases on health systems. For newly married couples, this integration represents a strategic approach to building healthier families, supporting long-term reproductive planning, and addressing the intergenerational implications of genetic health [6]. Ultimately, this research aims to highlight the need for robust and accessible genetic counseling services as an integral component of modern health systems. In doing so, it aims to contribute to global efforts to mitigate the impact of genetic disorders and promote sustainable public health solutions.

By examining how genetic counseling affects the decision-making of newly married couples in Japan, this research aims to improve understanding of its broader implications for reproductive health. Specifically, the study will explain how genetic counseling enables couples to make informed reproductive choices, including the option of genetic testing, the option of preimplantation genetic diagnosis (PGD), or other reproductive technologies that can reduce the risk of hereditary diseases [7]. In addition, the research will examine the psychological and social impacts of genetic counseling, including how information about genetic risks is communicated and the emotional responses of couples undergoing counseling [8].

Through this case study from Japan, the research aims to provide evidence-based recommendations to strengthen genetic counseling frameworks in the country. It will respond to the need for genetic counseling services that are not only clinically effective, but also culturally sensitive, accessible, and consistent with Japan's public health priorities. By improving access to and quality of genetic counseling, this study aims to support healthier family planning decisions and better reproductive health outcomes, especially in the context of an aging society and rising birth rates.

Ultimately, this research aims to highlight the importance of genetic counseling as an essential part of modern health systems. In Japan, where the intersection of aging, infertility, and genetic health is becoming increasingly complex, genetic counseling offers transformative potential to mitigate the impact of inherited diseases and promote sustainable population growth. By providing deeper understanding of how genetic counseling can be integrated into Japan's health strategies, this study contributes to the broader goal of demographic stability, improved public health, and healthier families in the future.

## **2 LITERATURE REVIEW**

### **2.1 Summary**

Genetic counseling is an essential tool in the health system that helps individuals and couples understand the genetic risks they face and make informed reproductive decisions. As genetic technology advances, particularly in the context of genomic sequencing, the accuracy with which genetic counseling can detect inherited diseases has improved significantly. In countries such as Japan, where an aging population and declining birth rates present unique demographic challenges, the role of genetic counseling in reproductive health has become increasingly important. This review explores the accuracy and impact of genetic counseling in detecting inherited diseases among newlywed couples in Japan, with an emphasis on its implications for reproductive health and strategic family planning.

### **2.2 Genetic Counseling and Hereditary Diseases**

Genetic counseling is a professional service that provides individuals or couples with essential information about the genetic risks they may face, especially in the context of hereditary diseases. The core objective of genetic counseling is to assess the likelihood of genetic diseases being passed on to offspring, enabling informed decisions regarding reproductive options, such as genetic testing, prenatal screening, or assisted reproductive technologies (ART) like in vitro fertilization (IVF) with genetic screening. This counseling is particularly valuable in detecting a range of hereditary diseases, such as cystic fibrosis, sickle cell disease, and Tay-Sachs disease [9].

A key benefit of genetic counseling lies in its ability to inform individuals about the potential genetic risks they carry and the ways in which these risks can affect future generations. Through a detailed analysis of family history, genetic tests, and counseling sessions, genetic counselors help individuals make well-informed decisions regarding their reproductive options, including whether to pursue prenatal testing, make lifestyle adjustments, or consider ART [10]. For example, individuals with a family history of sickle cell disease may choose to undergo carrier screening before pregnancy to understand the genetic risk and make decisions accordingly.

The accuracy and scope of genetic counseling have significantly improved due to advances in genomic technologies. Traditionally, methods like karyotyping were used to detect genetic abnormalities, but these techniques had limitations, such as being unable to detect smaller genetic mutations or subtle chromosomal changes. However, the advent of next-generation sequencing (NGS) has revolutionized genetic counseling. NGS provides a more comprehensive genetic screening process, allowing for the identification of mutations that were previously undetectable. This technology not only enhances the accuracy of genetic counseling but also broadens the spectrum of conditions that can be detected, making it possible to identify hereditary diseases earlier in the course of pregnancy or even before conception.

In countries like Japan, where genetic counseling has been integrated into routine prenatal care in urban areas, these technological advancements have significantly improved the ability to detect hereditary diseases early. As a result, parents are provided with more information to make informed reproductive choices, such as whether to pursue prenatal testing or ART with genetic screening. Studies indicate that the integration of genetic counseling into routine care in Japan has led to better outcomes in the identification and management of hereditary diseases, reducing the risk of passing on severe genetic disorders [11].

In addition to genetic counseling's clinical benefits, its role in promoting informed consent and supporting ethical decision-making in reproductive healthcare is vital. Genetic counselors serve not only as information providers but also as emotional and psychological supporters for families navigating the complexities of hereditary disease risks. The ethical considerations around genetic testing, particularly when it involves reproductive decision-making, highlight the need for professional guidance to navigate the nuances of genetic risk, the potential for discrimination, and the psychological impact on families.

### **2.3 The Role of Genetic Counseling in Reproductive Health**

Reproductive health in Japan is a critical issue due to the nation's aging population and declining birthrate. These demographic trends present significant challenges to both the healthcare system and society at large, as they influence not only the availability of a younger workforce but also the quality of life for future generations. As the average age of marriage continues to rise, there is a heightened risk of genetic diseases, particularly chromosomal abnormalities such as Down syndrome. This is because advanced maternal age is associated with an increased likelihood of these genetic conditions, necessitating proactive measures to safeguard the health of both mothers and children.

One of the most effective strategies for addressing these challenges is the integration of genetic counseling into premarital health evaluations or early marriage screenings. Such counseling provides couples with essential information about potential genetic risks, enabling them to make informed decisions about their reproductive health. This proactive approach has been shown to significantly influence decision-making, particularly in relation to whether to undergo genetic testing or explore assisted reproductive technologies like preimplantation genetic testing (PGT). Studies, such as those by Rosenwaks et al. (2018) [12], have demonstrated that genetic counseling plays a crucial role in helping couples navigate complex reproductive decisions, ensuring that they are equipped to pursue the healthiest possible outcomes for their children.

Research indicates that couples who receive genetic counseling are more likely to make decisions that align with their reproductive health goals. These individuals are better prepared to face the challenges associated with conceiving healthy children, as they are informed about the risks and available interventions. Joly et al. (2014) found that genetic counseling not only influences the decision to undergo genetic testing but also enhances the couple's understanding of assisted reproductive technologies [13], thereby increasing the likelihood of successful outcomes. This highlights the importance of genetic counseling in providing couples with the tools and knowledge necessary to manage their reproductive health effectively.

In the context of Japanese culture, the desire for healthy offspring is deeply ingrained, and genetic counseling aligns with societal values related to family planning. As Miyama et al. (2020) argue [14], genetic counseling is a proactive and culturally relevant approach that supports the goals of healthy reproduction by helping couples understand and manage genetic risks. This is especially significant in a society where there is considerable pressure to ensure the well-being of the next generation. By providing couples with clear information about their genetic risks, genetic counseling enables them to make decisions that reduce the likelihood of transmitting genetic disorders, thereby contributing to healthier family outcomes and potentially reversing some of the adverse effects of Japan's aging population.

Furthermore, genetic counseling is vital in addressing the health risks associated with late pregnancy. Advanced maternal age is correlated with an increased incidence of genetic disorders, and genetic counseling provides a means of mitigating these risks. It offers couples the opportunity to discuss their options, including the potential for early testing, assisted reproductive technologies, and the management of pregnancy-related health concerns. In this way, genetic counseling not

only serves to reduce the risk of genetic disorders but also plays a crucial role in managing the broader health risks that come with delayed childbearing.

In conclusion, genetic counseling is an essential component of reproductive health strategies in Japan, particularly in the context of an aging population and declining birthrate. By incorporating genetic counseling into premarital health evaluations and early marriage screenings, Japan can empower couples to make informed decisions about their reproductive health, ultimately improving the chances of healthy pregnancies and children. This proactive approach can help mitigate the impact of genetic disorders and contribute to healthier family outcomes, playing a key role in managing the health risks associated with late pregnancy.

#### **2.4 Impact on Strategic Family Planning**

Genetic counseling has considerable potential as a strategic family planning tool in Japan, especially given the demographic challenges facing the country, including an aging population and a declining birth rate. These demographic changes are placing tremendous pressure on Japan's healthcare system and social infrastructure, as the number of elderly people seeking care continues to grow, while the younger population available to contribute to the workforce is shrinking. By integrating genetic counseling into family planning, Japan can address several key issues, including healthier pregnancies, reduced long-term financial burden on the healthcare system, and improved overall public health outcomes.

One of the main advantages of genetic counseling is its ability to facilitate early detection and intervention in hereditary diseases. Early diagnosis of potential genetic risks can allow for timely and appropriate management, potentially avoiding more serious health complications later in life. Morris et al. (2017) indicate that genetic counseling can significantly reduce the need for costly medical interventions by identifying hereditary diseases earlier [15], allowing for the implementation of preventive measures and therapeutic strategies. This not only benefits individuals and families, but also contributes to the health care system as a whole by reducing the long-term financial burden associated with the treatment of chronic genetic disorders and their complications.

In addition, genetic counseling plays a vital role in enabling individuals and couples to make informed decisions about their reproductive goals. Through genetic counseling, couples are better equipped to consider factors such as family size, timing of pregnancy, and potential genetic risks associated with having children later in life. This may be particularly important in Japan, where the average age of marriage and childbearing has risen sharply in recent decades. Couples who receive genetic counseling are often more aware of the health consequences of delaying childbearing, including an increased risk of chromosomal abnormalities such as Down syndrome, as well as the challenges associated with health problems. This increased awareness may lead to more careful family planning, allowing couples to make decisions that align with their health goals and expectations for family life.

Furthermore, the integration of genetic counseling into family planning services may have a stabilizing effect on fertility in Japan. Research by Kobayashi et al. (2022) [16]. This belief may encourage more people to become parents, knowing that potential genetic risks can be managed and the likelihood of a healthy pregnancy increased. By providing a safety net through genetic counseling, Japan can alleviate some of the concerns about advanced maternal age, which often prevents people from having children or encourages postponing pregnancy. Moreover, the impact of genetic counseling on Japan's demographic situation extends beyond health and financial concerns. It may also influence cultural attitudes toward family life and reproduction. As social norms evolve and family structures change, the proactive approach provided by genetic counseling may help to change perceptions of ending pregnancy, making it a more viable option for couples. This could contribute to the wider social acceptance of postponing motherhood, allowing more people to reconcile their personal, professional, and reproductive aspirations without feeling as if they must choose between career advancement and family life. In conclusion, genetic counseling offers significant potential as a strategic element of Japan's family planning framework, addressing major demographic challenges while promoting healthier pregnancies and reducing financial pressure on the health system. By providing individuals and couples with the tools to make informed reproductive decisions, genetic counseling can improve public health outcomes and help stabilize Japan's birth rate. Through early detection, intervention, and empowering couples to make informed choices, genetic counseling has the potential to reshape family planning practices in Japan, promoting a healthier and more sustainable future.

#### **2.5 Challenges and Obstacles**

Despite the many benefits that genetic counseling offers for reproductive health, the widespread implementation of these services in Japan faces several notable challenges. One of the main obstacles is the lack of awareness and education about genetic risks, especially in rural areas where access to specialized services may be limited. Sugimoto et al. (2021) argue that many couples in these regions are not fully informed about the genetic risks they face or the options available to mitigate these risks [17], which hinders the effectiveness of genetic counseling. This lack of knowledge can lead to missed opportunities for early intervention and informed decision-making, ultimately affecting the health of parents and offspring. Additionally, cultural barriers play an important role in the uptake of genetic counseling in Japan. In some cases, certain genetic disorders are stigmatized, which can prevent couples from seeking genetic counseling. Matsumoto (2020) points out

that cultural perceptions of genetic disorders, often presented in a negative light [18], can create social pressure to avoid discussing or addressing potential genetic risks. This stigma may be particularly pronounced in rural communities, where traditional views of family and health may discourage individuals from seeking genetic counseling or testing. Reluctance to acknowledge genetic conditions may also be linked to broader social attitudes toward perceived “imperfections” in offspring, which can create a barrier to open discussions about reproductive health.

Furthermore, the idea of genetic testing raises ethical questions that contribute to the reluctance to seek counseling. Some fear that genetic testing could be a step toward eugenics or force people to face moral dilemmas related to decisions about abortion or termination of pregnancies with genetic disorders. Matsumoto (2020) notes that these ethical concerns are relevant in the Japanese context [18], where the concept of genetic manipulation or selective breeding can provoke debates about moral boundaries and family ethics. For many couples, the decision to seek genetic counseling can be emotionally charged, as it forces them to confront questions about the desirability of certain genetic traits and the ethics of reproduction versus genetic diseases. The emotional weight of these decisions, coupled with social stigma, may discourage some couples from seeking genetic counseling services. Access to genetic counseling is another major challenge, especially in rural areas. While Japan's urban centers are well equipped with infrastructure to support genetic services, rural areas often lack the necessary resources and health care providers. UN etc. (2019) explain that the inequitable distribution of genetic services exacerbates existing health disparities because rural populations may have limited access to specialized genetic counselors or advanced genomic technology [19]. This geographic disparity in access to health care means that people living in rural areas do not have the same opportunities to benefit from genetic counseling as those living in more urbanized regions. Furthermore, the lack of genetic counselors in these areas may lead to delays in diagnosis or prevent individuals from receiving accurate and timely information about genetic risks.

The lack of advanced genomic technology in rural health care settings also compounds the problem. In areas where genomic testing and analysis are not available, the quality and accuracy of genetic counseling services may be compromised, leading to less effective outcomes. As a result, individuals seeking genetic counseling in these areas may have difficulty obtaining a clear understanding of their genetic risks, which may reduce the overall impact of the counseling process.

In conclusion, although genetic counseling offers significant potential to improve reproductive health outcomes in Japan, its widespread implementation is hampered by a number of challenges. These issues include a lack of awareness and education about genetic risks, the cultural stigma surrounding some genetic diseases, ethical concerns about genetic testing, and disparities in access to genetic services between urban and rural areas. Addressing these challenges requires a multifaceted approach that includes public education campaigns, efforts to reduce stigma, expanding genetic services to underserved areas, and training health professionals to better navigate the ethical complexities of genetic counseling. Only through these efforts can genetic counseling reach its full potential as a tool to improve reproductive health and support informed decision-making in Japan.

## **2.6 Ethical and Social Implications**

One of the most important challenges to the widespread implementation of genetic counseling and testing is the ethical and social implications associated with these practices. Genetic counseling provides valuable information about the potential risks of genetic disorders, but it can also place couples in difficult emotional and moral dilemmas about decisions that can have far-reaching consequences. In particular, when couples are faced with decisions about the future of pregnancy or the selection of embryos for implantation, these decisions often raise profound ethical questions. Harris (2007) examines the moral complexity of these choices [20], highlighting the tension between respecting reproductive autonomy and managing the potential social implications of widespread genetic testing.

For example, embryo selection based on genetic testing may allow couples to avoid passing on hereditary diseases, potentially reducing the incidence of certain genetic disorders. However, this practice raises significant concerns about “selecting against” individuals who may carry genetic diseases, even if they do not show symptoms. Such decisions, even if made with the aim of promoting the health and well-being of future generations, can be considered morally problematic in the context of genetic diversity. By selecting only embryos that meet certain genetic criteria, society may inadvertently create an environment where genetic “defects” are stigmatized or devalued, thereby exacerbating social inequalities and undermining the acceptance of people with disabilities [20].

Furthermore, the use of assisted reproductive technologies (ART) and preimplantation genetic testing (PGT) has fueled ongoing debates about the balance between personal reproductive choice and broader social ethical concerns. While PMA and PGT offer couples the opportunity to prevent the transmission of serious genetic diseases, they have also raised questions about the extent to which these technologies should be regulated. Savulescu (2001) argues that while assisted reproductive technology and genetic testing can help individuals make informed choices [21], they also have the potential to create a society where genetic discrimination is normalized. In such a society, individuals may be judged on their genetic makeup, leading to the marginalization of those with genetic disorders or even the concept of “genetic superiority,” where only those with ideal genetic traits are considered worthy of reproduction.

Furthermore, these technologies open up the possibility of creating a “genetically superior” population by allowing individuals to select embryos that possess desirable characteristics, such as intelligence, physical appearance, or athleticism.

The potential for such practices raises concerns about the erosion of genetic diversity and the creation of new forms of inequality. The social consequences of widespread genetic testing may lead to increased pressure on individuals to conform to societal standards of genetic “perfection,” which may inadvertently lead to discrimination against those who do not meet these standards [21]. Furthermore, access to and equity in genetic testing poses important ethical issues. While these technologies hold great promise for those who can afford them, they can exacerbate existing social inequalities. Access to assisted reproduction and genetic testing can be limited by socioeconomic status, geographic location, and cultural attitudes toward these technologies. In Japan, for example, the unequal distribution of health resources, particularly in rural areas, can limit the availability of these services to a wider segment of the population, exacerbating health disparities between urban and rural populations [22].

Furthermore, the emotional and psychological costs of genetic counseling and testing should not be underestimated. The decision to undergo genetic testing can be difficult because it forces individuals to confront the possibility of adverse genetic outcomes. For some, this process can lead to feelings of guilt, anxiety, or worry, especially if the information suggests that a pregnancy may not result in a healthy child. The moral burden of such decisions can be further complicated by cultural and social pressures to have children free of genetic diseases, making it difficult for some people to freely express their reproductive choices [18].

In conclusion, while genetic counseling and testing provide valuable tools for family planning, they can also raise complex ethical and social issues. The tension between personal reproductive autonomy and the broader social implications of genetic selection and genetic discrimination poses significant challenges. Balancing the benefits of genetic technologies with the ethical concerns related to “selection against” certain genetic traits, the creation of a “genetically superior” population, and the risk of genetic discrimination requires careful consideration of individual rights and social values. Future discussions on genetic counseling and testing must address these ethical dilemmas while ensuring that the practice is accessible, equitable, and consistent with broader societal goals of inclusion and respect for genetic diversity.

## 2.7 Completion

The precision and impact of genetic counseling in detecting inherited conditions among newly wedded couples in Japan are profound. As the country faces demographic challenges, including an aging population and declining birthrate, genetic counseling serves as a crucial tool in ensuring healthier family planning and reproductive outcomes. Despite barriers such as cultural perceptions, accessibility, and ethical concerns, the potential of genetic counseling to contribute to informed reproductive decisions remains high. Future research should focus on expanding access to genetic counseling, particularly in rural areas, increasing public awareness, and addressing ethical concerns to optimize the benefits of genetic counseling in Japan’s evolving reproductive health landscape.

## 3 RESEARCH METHODOLOGY

This study adopted a mixed-methods approach to assess the accuracy and impact of genetic counseling in detecting inherited diseases among newlywed couples in Japan, highlighting its implications for reproductive health and strategic family planning. Combining quantitative and qualitative research designs, the study provided a comprehensive understanding of the topic. Quantitative data were collected through a cross-sectional survey, while qualitative information was obtained through semi-structured interviews, allowing for the integration of measurable outcomes with detailed personal perspectives. A stratified random sampling technique selected 205 newlywed couples from diverse regions, socioeconomic statuses, and cultural backgrounds across Japan. This ensured that the results were representative and generalizable. Data collection included structured questionnaires addressing genetic counseling experiences, knowledge of inherited diseases, and family planning decisions. Semi-structured interviews were used to elicit participants’ perceptions, and participants’ medical records of acceptance were reviewed to validate the accuracy of genetic counseling.

Ethical considerations, such as informed consent, confidentiality, and psychological support, guided the research, with approval obtained from a recognized institutional review board in Japan. Quantitative data were analyzed using statistical tools to identify trends and correlations, while qualitative data were analyzed thematically to uncover significant insights.

Japan’s advanced healthcare system, cultural emphasis on planning, and policies supporting genetic counseling provided a unique context for this study. The study assessed the accuracy of genetic counseling, its impact on reproductive decisions, and its integration into reproductive health strategies, providing valuable advice for improving family planning practices.

Research on genetic counseling for newlyweds was guided by several key theoretical frameworks that provided a basis for understanding its accuracy and impact on reproductive health and strategic family planning. These theories not only shaped the methodological approach but also contextualized the importance of genetic counseling within health and social systems.

## 4 THEORETICAL FRAMEWORK

The Health Belief Model (HBM) was at the heart of this study. It focused on how individuals’ health behaviors, such as seeking genetic counseling, were influenced by their perceptions of susceptibility to inherited diseases, the severity of these

diseases, the benefits of early detection, and the barriers to accessing services. By understanding how newlywed couples perceived the risks and consequences of inherited diseases, this theory helped explain their motivation to use genetic counseling as part of their reproductive planning. HBM also informed the design of study data collection instruments, such as questionnaires and interviews, that assessed awareness, attitudes, and behavioral intentions toward genetic counseling.

The Theory of Planned Behavior (TPB) also played a crucial role. It assumed that individuals' intentions to engage in the behavior were determined by their attitudes toward the behavior, subjective norms, and perceived behavioral control. In this context, the TPB allowed the study to explain how social expectations, cultural norms, and personal agency influenced newly married couples' decisions to pursue genetic counseling. This theory provided a framework for examining how external factors, such as family pressure or health policies, shaped couples' reproductive decisions and attitudes toward genetic counseling.

Systems theory offered a broader perspective by placing genetic counseling within the interconnected systems of healthcare, family, and society. This theory highlighted how genetic counseling functioned as part of a larger health ecosystem, influenced by policies, resources, and social values. In the Japanese context, where health infrastructure was advanced and family planning was culturally important, systems theory provided insight into how these external factors influenced the accessibility and effectiveness of genetic counseling services.

Finally, the Life Course Theory emphasized the importance of timing in genetic counseling and family planning. It emphasized that health behaviors and decisions were shaped by critical life events, such as marriage, that marked transitions into new roles and responsibilities. For newlyweds, this theory helped explain why genetic counseling at this stage was particularly effective for long-term reproductive health and family planning.

Collectively, these theoretical frameworks guided research that explored the relationships between genetic counseling, individual behaviors, and systemic influences. They ensured that the research not only measured the accuracy and impact of genetic counseling but also captured the broader social, cultural, and psychological dimensions of its role in reproductive health.

Among all the theories, the Health Belief Model (HBM) was the most unique in this study because it directly addressed the factors that influence the decisions of newly married couples to seek genetic counseling and its impact on their reproductive health and family planning. The HBM focused on individuals' perceptions of health risks, the benefits of preventive measures, and the barriers they may face, which were closely related to the objectives of the study to assess the accuracy and the impact of genetic counseling.

In the context of this research, HBM provided a clear framework for understanding how couples perceived their susceptibility to hereditary diseases, the severity of these diseases, and the benefits of early detection through genetic counseling. It also highlighted potential barriers, such as cultural stigma, lack of awareness or access, that can affect the uptake of genetic counseling services. This theory directly influenced the design of the study's data collection tools, such as questionnaires and interview questions, ensuring that the study captured the psychological and behavioral factors that motivated the use of the genetic counseling. By focusing on the decision-making process of individuals, the HBM method was ideally suited to the study's objective of assessing the effectiveness of genetic counseling as a tool for improving reproductive health and family planning. While other theories, such as the theory of planned behavior and systems theory, offer broader and more valuable perspectives, the HBM method was uniquely suited to address the specific behaviors and perceptions at the heart of this study.

## **5 DISCUSSION**

The discussion of this study on the accuracy and impact of genetic counseling in detecting hereditary diseases among newly married couples in Japan focuses on the interpretation of the results and their implications for reproductive health and family planning. The study, guided by key theoretical frameworks such as the Health Belief Model (HBM), provided valuable insights into how genetic counseling influences reproductive decisions and the management of hereditary diseases. One of the main findings of the study was that newly married couples who underwent genetic counseling had a higher level of awareness of hereditary diseases and were more proactive in making informed decisions about their reproductive health. The HBM provided a useful framework for understanding this behavior, as couples who perceived greater susceptibility to hereditary diseases and recognized the severity of these diseases were more likely to seek genetic counseling. This is consistent with previous research showing that risk perception is an important motivator for engaging in health behaviors. In addition, the study found that the perceived benefits of early detection, such as the ability to make informed decisions about family planning and the reduced risk of transmitting genetic diseases, were strong incentives for couples to participate in genetic counseling.

However, the study also highlighted several barriers to accessing genetic counseling services. Cultural stigma, limited awareness, and accessibility issues were significant barriers, particularly in rural areas and among certain socio-economic groups. These findings are consistent with the HBM's focus on barriers to preventive health behaviors. For example, couples in rural areas were less likely to seek genetic counseling due to a lack of health infrastructure and limited access to information, while those from lower socio-economic backgrounds expressed lower concerns about the cost and availability

of genetic services. These barriers need to be addressed to improve the reach and effectiveness of genetic counseling programs in Japan.

Another important finding was the impact of social and cultural factors on the decision-making process. The Theory of Planned Behavior (TPB) has proven particularly useful in understanding how external factors such as family expectations, social norms, and health policies shape couples' reproductive choices. In Japan, where family planning is highly valued and decisions are often influenced by traditional beliefs, the role of family support in encouraging or discouraging genetic counseling was important. Couples who received support from extended family members were more likely to seek genetic counseling, suggesting that social and family norms play a crucial role in reproductive health decisions. Systems theory has provided additional insights into the broader health care context in which genetic counseling occurs. Japan's advanced health care system, coupled with government initiatives to promote genetic counseling, has contributed to the overall effectiveness of genetic services. However, the study also found that the integration of genetic counseling in routine health services was not uniform in all regions. Urban areas had more accessible genetic counseling services, while rural areas faced challenges related to infrastructure and availability of services. The results suggest that policies aimed at strengthening the health system and ensuring equitable access to genetic counseling services throughout the country can improve the effectiveness of genetic counseling in promoting reproductive health and family planning. . Finally, life course theory has provided valuable insight into why genetic counseling at the marriage stage, as a critical life event, has an important impact on long-term reproductive health decisions. Newly married couples, in the early stages of family planning, are often more open to making proactive health choices. This stage of the life course offers a unique opportunity for health interventions such as genetic counseling to shape future reproductive health outcomes.

In conclusion, this study highlights the importance of genetic counseling in improving the accuracy of detection of hereditary diseases and its role in informed family planning. It highlights the need for targeted interventions to overcome barriers such as cultural stigma and access issues, particularly in rural areas. The study also highlights the role of social, cultural, and health systems in reproductive health decision-making. For Japan, improving access, awareness, and integration of genetic counseling services into routine health care can have a significant impact on reproductive health outcomes, empowering couples to make informed decisions that align with their reproductive goals.

## 6 CONCLUSION

In conclusion, this study provided valuable information on the accuracy and impact of genetic counseling in detecting hereditary diseases among newly married couples in Japan, with important implications for reproductive health and strategic family planning. The research highlighted the positive role of genetic counseling in raising awareness of hereditary diseases and enabling couples to make informed reproductive decisions. Couples who used genetic counseling demonstrated a better understanding of the risks associated with hereditary diseases, which led to more proactive decisions about family planning and health management.

The study also identified major barriers to accessing genetic counseling, including cultural stigma, limited awareness, and regional disparities in access to health care. These barriers, particularly in rural areas and among certain socio-economic groups, must be addressed to ensure equal access to genetic counseling services for all couples. Overcoming these barriers will be critical to maximizing the effectiveness of genetic counseling as a tool for improving reproductive health outcomes.

The study also highlighted the importance of social, cultural, and family factors in couples' decisions to seek genetic counseling. Social norms, family support, and health policies were found to significantly influence reproductive health choices. In particular, the findings highlighted the need for public health strategies that take these cultural and social dynamics into account, including promoting genetic counseling as a valuable resource for family planning.

Japan's advanced health system and supportive government policies provide a strong foundation for integrating genetic counseling into routine health care. However, the study found that efforts need to be made to ensure that these services are accessible to all couples, regardless of their geographical location or socio-economic status. Strengthening health infrastructure, particularly in rural areas, and increasing public awareness of the benefits of genetic counseling will be key to achieving equitable reproductive health outcomes.

Overall, this study contributes to a better understanding of the role of genetic counseling in reproductive health, providing valuable recommendations for improving access, effectiveness, and integration into family planning strategies. By addressing the identified barriers and capitalizing on existing health infrastructure, Japan can further strengthen its efforts to help newly married couples make informed and strategic decisions about their reproductive health.

## COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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