

Navigating Ethical Challenges in COVID-19 Vaccination Programs: A Qualitative Study of Health Worker Perspectives

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Abstract

Following the emergence of the COVID-19 pandemic, numerous nations focused on developing and delivering reliable vaccines to manage the outbreak and safeguard community well-being. The deployment of immunization efforts has raised several moral challenges that require careful identification and resolution. For this reason, the current investigation aimed to explore the ethical aspects of COVID-19 immunization as viewed by frontline healthcare personnel. This qualitative investigation took place in 2022 across northern Iran. It involved 23 healthcare professionals with at least 5 years of practical experience and who actively participated in COVID-19 immunization initiatives. Information gathering began with organized, semi-structured discussions, continued through snowball sampling, and ended when no new insights emerged. The process then included converting the discussions into written form, pinpointing key meaning segments, assigning codes, organizing codes by shared characteristics and alignment, deriving overarching themes, and evaluating those themes with content analysis methods.

Reviewing the accounts shared by participants yielded five core theme categories and fifteen supporting sub-categories concerning the ethical dimensions of COVID-19 immunization. The primary categories encompassed secure, regulated vaccine manufacturing; vaccine distribution; equity; honoring personal choice; and responsibility. The sub-categories covered adherence to established scientific and moral guidelines, vaccine performance and cost-benefit balance, lack of serious negative reactions, distribution of supplies for vaccine provision, vaccine accessibility, variety and completeness of substitute vaccine options, vaccine distribution sequencing, emphasis on at-risk groups within the population, individual patient independence (equal entitlements), collective societal independence, independence of healthcare deliverers, accurate disclosure of facts, disclosure of vaccine reactions, and societal confidence along with uptake. Leaders within the healthcare framework need adequate readiness to address the moral issues arising from COVID-19 immunization programs. It is thus suggested to avoid rushed immunization implementation, increase focus on immunization safety benchmarks, ensure ample supplies for full-scale vaccine availability, carefully weigh group benefits against personal preferences, and meet the expectations of the broader population.

Keywords: Vaccination, COVID-19, Coronavirus, Vaccine, Ethics, Public health emergency

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Introduction

On Dec 29, 2019, medical staff at facilities in Wuhan, China, identified atypical instances of pneumonia among patients. It was at that point that reports began circulating about the atypical transmission of the virus across multiple sites [1]. Eventually, on Jan 9, 2020, the World Health Organization (WHO) stated that the underlying

agent responsible for this condition was an emerging coronavirus, designated nCoV-2019 [2]. As infection numbers climbed and the pathogen spread globally, on Jan 30, 2020, the WHO classified the novel coronavirus outbreak as the sixth international public health crisis, posing a risk to every country [3]. The coronavirus family (COVID-19) includes a wide range of viruses capable of triggering respiratory illnesses, from ordinary colds to more severe illnesses like MERS and SARS [4]. Clinical presentations of the virus differ significantly in intensity [5]. Primarily, the COVID-19 pathogen induces breathing difficulties, with signs progressing from gentle conditions featuring bodily aches, throat irritation, persistent coughing, elevated temperature, loss of smell, and loose stools [5-9] to more intense manifestations involving sudden breathing failure, widespread organ dysfunction, and in extreme cases, loss of life [10].

Multiple tactics have been utilized to counter the transmission of contagious illnesses. Governments implement diverse regulatory measures and required actions, including obligatory immunization, compulsory health assessments, seclusion periods, separation protocols, or the confinement of affected individuals [11]. Several authorities support enforced medical care or immunization for contagious conditions and typically argue that requiring mandatory healthcare responses during infectious outbreaks or insisting on compulsory immunization of citizens against such threats is both logical and unavoidable. Conversely, other groups perceive any unwarranted breach of a patient's freedom to decide independently and exercise self-governance as immoral and incompatible with basic human entitlements, irrespective of overwhelming data on the vaccine's advantages [12]. Still, the COVID-19 situation has made compulsory immunization a highly disputed matter [13]. Although legal frameworks play a key role in protecting people from unreasonable encroachments on personal freedoms, communal health priorities can at times be so pressing or the threat to well-being so acute that forceful interventions become defensible [14]. As a result, obligatory steps intended to protect population health—such as efforts to stop or contain outbreaks—have stirred debate and strained relations between authorities and citizens, while highlighting clashes between personal liberty and societal welfare [15]. To address the COVID-19 situation in Iran, various measures were introduced, including business shutdowns, caps on workplace staffing levels, shortened shifts for public sector workers, school closures, physical

distancing requirements in transit systems and communal areas, and, ultimately, the initiation of a COVID-19 immunization campaign. Due to limited COVID-19 vaccine supplies in Iran, the rollout followed a tiered approach. It initially targeted medical teams, then extended to those with chronic conditions and adults aged 60 and over, and later covered the remaining groups. Efforts to expand immunization coverage included educational drives and promotional activities to encourage uptake, later supplemented by restrictions on public amenities for unimmunized individuals. Mandating shots for public sector staff, blocking journeys for individuals missing proof of vaccination, and denying coverage benefits to COVID-19 patients who had not been immunized formed elements of Iran's approach to handling the outbreak. That said, full application of these approaches did not occur [16].

Today, immunization serves as a vital tool for managing infectious diseases [17]. Compulsory vaccination is considered a key readiness measure in the face of a serious, preventable epidemic [13]. Vaccines have successfully lowered death rates from outbreaks around the world. According to the WHO, roughly 80% of infectious diseases globally are linked to conditions responsible for over 20 million deaths annually [17]. Thus, vaccination plays a central role in curbing infectious diseases and offers a highly cost-effective solution [18].

People worldwide continue to live in anxiety over COVID-19, having lost family members and close relatives to the illness [19]. By January 2022, the WHO had recorded more than 330 million confirmed COVID-19 cases and over 5,500,000 deaths [9]. The actual numbers are likely much higher. The pandemic has also triggered severe economic upheaval, with the World Bank noting that the global downturn it caused has exceeded only by the two World Wars and the Great Depression over the last century and a half [17]. Almost 50% of the world's 3.3 billion workforce face the threat of losing their livelihoods [2]. Given the profound social and personal consequences of COVID-19, along with the risk of more virulent mutations emerging, imposing mandatory vaccination during such pandemics appears reasonable [15].

Even before this pandemic, vaccine reluctance was a well-known issue, and the WHO listed it as one of the ten major global health threats in 2019 [20]. To date, several COVID-19 vaccines have received approval and are being administered across many countries [21].

However, the entire journey from vaccine development to widespread use raises distinct ethical concerns [22]. The most frequent worries regarding vaccination stem from questions about safety and skepticism toward pharmaceutical companies [23]. Acceptance of vaccines is also closely tied to public confidence in governmental authorities [24]. These doubts are often fueled by inaccurate, poorly informed, or unethical dissemination of fabricated scientific claims [25].

Naturally, once an effective vaccine formula is developed, only a limited number of countries can manufacture it on a large scale. Other nations must then purchase it, leading to intense competition over production capacity, pricing, and potential commercialization. In lower-income developing countries, acquiring and distributing vaccines becomes particularly difficult. Even within nations, many at-risk groups may lack the means to obtain the vaccine. Fair policies and regulations, therefore, require that vulnerable and high-risk populations receive priority access [22].

Findings from the Pourshahri *et al.* study indicated that living with high-risk individuals (88.5%) and respecting others' rights (80.9%) were the strongest motivators of vaccine acceptance. In comparison, concern over side effects ranked third at 63%. Meanwhile, anxiety about vaccine ingredients and uncertainty regarding its effectiveness (45.3%) ranked as the primary reasons for refusal [17]. Similarly, previous research highlighted that individuals may reject vaccination for various reasons, including mixed messages from mass media, widespread distrust, perceived links between vaccination and certain illnesses, and the relatively low mortality risk from COVID-19 among younger and healthier populations [17].

Whenever societies confront major public health dangers — the latest being the SARS-CoV-2 (COVID-19) virus — ethical dilemmas quickly become subjects of intense debate [26]. The COVID-19 vaccine, regarded as the primary means to contain this deadly disease, entered the health sector amid a host of ethical challenges. These challenges are unprecedented in the modern era and are expected to influence the global economy and society for years ahead [27].

Therefore, beyond strictly following scientific protocols, health system leaders must be well prepared to address ethical issues and reach sound moral decisions. They need to weigh the advantages and disadvantages of vaccination for individuals against the consequences of

leaving society unprotected. With this in mind, the present study examined the ethical considerations surrounding COVID-19 vaccination.

Materials and Methods

Design of the study and selection of participants

The present qualitative study employed a content analysis design. This approach was chosen to investigate the lived experiences of ethical issues related to COVID-19 vaccination. The study population included healthcare workers (specifically vaccination experts serving communities) at health facilities in northern Iran (Mazandaran province) in 2022. Sampling began with purposeful selection and continued using the snowball technique, in which participants who met the criteria initially recommended subsequent individuals. Interviews proceeded until data saturation was achieved, which occurred after speaking with 23 health experts.

Data were gathered through semi-structured one-on-one interviews. These interviews followed a set of broad guiding questions (**Table 1**). The interview protocol was designed exclusively for this research.

Inclusion criteria required participants to be healthcare workers with at least 5 years of experience in health centers in Mazandaran province, to be active members of public vaccination teams, and to be able to articulate their experiences clearly. The sole exclusion criterion was any condition that would prevent them from describing their caregiving experiences (for example, inability to speak). Researchers made every effort to ensure diversity among participants.

A semi-structured interview format was utilized for data collection. After determining a suitable, quiet location for the interviews based on the study goals and inclusion criteria, eligible participants were approached. Following informed consent and assurances of complete confidentiality, face-to-face interviews were conducted. With participants' permission, sessions were audio-recorded. Open-ended questions were posed, allowing individuals to share their personal experiences freely. Sample prompts included: "What thoughts come to mind when you hear about coronavirus vaccination?" "Please describe your experiences with COVID-19 vaccination," and "What ethical considerations have you observed in relation to COVID-19 vaccination?"

Throughout the sessions, emphasis remained on encouraging participants to reflect deeply on their direct experiences with the ethical aspects of COVID-19

vaccination. When additional clarification was needed, more specific follow-up questions were introduced. At the close of each interview, participants were invited to elaborate further on the ethical considerations they had mentioned. Subsequent probing and exploratory questions were tailored to the information shared, aiming to enrich understanding and deepen the discussion. Sampling continued until data saturation was reached and no further information emerged. The interviewer maintained an active listening approach as much as possible. Each interview lasted between 30 and 40 minutes, with duration adjusted according to the participant's comfort and responses.

Immediately after each interview, the researcher prepared a concise summary that captured the main ideas and the interviewer's interpretation of the discussion. Later, the audio files and written transcripts were reviewed thoroughly. The final manuscripts were cross-checked against the original recordings for accuracy. Content analysis was performed following the qualitative method proposed by Graneheim and Lundman [28], which involved the following stages:

1. The researcher transcribed all interviews and read them repeatedly to gain a thorough understanding.
2. Each entire interview was treated as a single unit of analysis.
3. Paragraphs, sentences, or individual words were identified as meaning units — groups of related words and sentences that share common content and are condensed and grouped by similarity.
4. These meaning units were abstracted and conceptualized based on their underlying meaning and then assigned codes.
5. Codes were compared for similarities and differences and organized into broader, more abstract categories with clear labels.
6. Finally, through ongoing comparison of categories and in-depth reflection, the underlying content within the data was identified and presented as the main themes of the study.

Table 1. Interview questions. From: Analysis of ethical considerations of COVID-19 vaccination: lessons for future.

No.	Paraphrased questions
1	Please describe your experiences related to COVID-19 vaccination.
2	What ethical challenges and considerations did you encounter during the COVID-19 vaccination process?

3	Based on your perspective and experiences, how would you evaluate the implementation of the COVID-19 vaccination program in the country?
4	What were the primary concerns of individuals at the time they received the vaccination?
5	What were the most frequently asked questions by people during the vaccination period?
6	What views did individuals seeking vaccination hold regarding the COVID-19 vaccine?
7	What has been your experience with mandatory COVID-19 vaccination and the imposition of restrictions on unvaccinated individuals?
8	Given the limited vaccine availability during the two years following the onset of COVID-19 in the country, please describe your experiences in selecting individuals for vaccination.

To ensure the study's accuracy and strength, Guba and Lincoln's trustworthiness criteria were applied [29]. Credibility was strengthened through prolonged engagement and interaction with participants, the collection of reliable data, and member checking. Dependability was enhanced via stepwise replication, systematic data collection and analysis, and review by the research supervisor, consultant, and external experts. Confirmability was supported by obtaining feedback and additional insights from university professors. Transferability was addressed by presenting participants' quotations verbatim and by providing rich, detailed descriptions in the research report, enabling other researchers to comprehend and potentially apply the findings on the ethical considerations of COVID-19 vaccination across different contexts.

To uphold ethical standards and safeguard participants' rights, the researcher obtained official approval from the Deputy of Research and Technology at Mazandaran University of Medical Sciences. The researcher then introduced themselves to the participants, clearly explained the study's objectives, and secured informed consent. Participants were assured that all interview content would remain strictly confidential and anonymous, in full accordance with ethical guidelines for research publication.

Ethics

This study received approval from the Ethics Committee of Mazandaran University of Medical Sciences (IR.MAZUMS.REC.1401.11796) and followed the ethical principles outlined in the Declaration of Helsinki [30]. Additionally, necessary permissions were secured

from relevant institutional authorities to reach potential participants across various organizations. Every participant provided signed informed consent, confirming they understood the purpose and scope of the research and agreed to the audio recording of their interview. All identifying personal and institutional information was stripped from the transcripts before coding and analysis.

Results and Discussion

The qualitative study incorporated the views of 23 healthcare providers (those delivering public vaccination services) working in health centers across Mazandaran province. The group included 7 doctors, 8 nurses, 4 hospital directors and administrators, and 4 public health specialists involved in delivering the COVID-19 vaccination initiative. 59% of the participants were female, and 41% were male. Almost half of them (43.5%) held doctoral degrees, while the remaining 56.5% possessed bachelor's or master's degrees (Table 2). From the detailed and comprehensive accounts shared by participants, 320 initial codes were derived. Through framework analysis, five main categories, fifteen sub-categories, and 45 specific items were identified (Table 3).

Table 2. Participants' demographic information to explain the ethical considerations of COVID-19 vaccination. From: Analysis of ethical considerations of COVID-19 vaccination: lessons for future.

Variable	Category	Frequency (%)
Sex	Female	13 (56.5)
	Male	9 (43.5)
Education	Bachelor's degree	8 (35)
	Master's degree	4 (17)
	Ph.D.	11 (48)
Occupation	Physician	7 (30.4)
	Nurse	8 (34.8)
	Administrator	4 (17.4)
	Health specialist	4 (17.4)
Age	20–30 years	2 (8.6)
	30–40 years	4 (17.4)
	40–50 years	13 (56.6)
	> 50 years	4 (17.4)
Work experience	< 10 years	3 (13)
	10–15 years	4 (17)
	15–20 years	11 (48)
	20–25 years	3 (13)
	> 25 years	2 (9)

Table 3. Extracted categories of ethical considerations of COVID-19 vaccination from the service providers' perspective. From: Analysis of ethical considerations of COVID-19 vaccination: lessons for future.

Category	Sub-category
Safe and standardized vaccine production	Adherence to scientific and ethical standards
	Vaccine efficacy and economic value
	Lack of serious health-related adverse effects
Vaccine provision	Allocation of resources for vaccine distribution
	Accessibility of vaccines
	Variety and inclusiveness of alternative vaccine options
Equity	Equitable distribution of vaccines
	Fair prioritization in vaccination
	Prioritizing vulnerable groups within society
Importance of autonomy	Patient autonomy (equal respect for individuals)
	Community autonomy
Accountability	Autonomy of healthcare providers
	Provision of accurate information
	Disclosure of vaccine adverse effects
	Public confidence and acceptance

Safe and standard vaccine production

The majority of study participants emphasized that manufacturing safe and standardized vaccines is essential and remains the responsibility of both the health system and the government. Expressions such as emergency use authorization, the newness of the vaccine technology, and uncertainty regarding long-term side effects reflected widespread public apprehension. Safe and standard vaccine production emerged as a core theme, encompassing three subcategories: adherence to scientific and ethical protocols, the vaccine's effectiveness and cost-benefit, and the absence of serious adverse reactions.

Compliance with scientific and ethical procedures

Nearly all participants highlighted adherence to scientific and ethical procedures as a key consideration drawn from their experiences. They specifically pointed to the granting of emergency authorization for COVID-19 vaccine production without completing standard scientific steps or proper clinical trials as a significant ethical issue. From the participants' viewpoint, "Many individuals were anticipating the arrival of safe and reliable vaccines that had fully completed the appropriate pre-clinical and clinical phases. However, the available

vaccines had not undergone the formal scientific review process before receiving WHO endorsement” (P14). Another participant remarked, “Anxiety over the virus must not lead to rushed decisions that overlook essential vaccine safety requirements” (P19). A further comment stated, “Beyond accelerating vaccine production for widespread use, health officials must also address all scientific aspects of manufacturing and stand ready to manage related ethical challenges” (P6).

Effectiveness and profitability of the vaccine

Many participants identified the actual performance of the vaccine doses as an important ethical matter in COVID-19 vaccination. One individual noted: “Several people who received the AstraZeneca vaccine experienced major issues, including breakthrough coronavirus infection or requiring hospital admission” (P18). Another shared, “I personally know individuals who tested positive for lung involvement on CT scans even after being vaccinated” (P14). A different participant added that “there remains skepticism about the vaccine’s true effectiveness and value. The potential for dangerous or harmful health consequences creates fear around using locally manufactured vaccines and undermines public willingness to accept them” (P19 and P4).

Absence of severe adverse effects

Most participants reported that at the launch of the national vaccination campaign, the public largely approached the program with considerable fear and expressed worries about possible complications such as sudden death, vaccine-induced infection, intense pain, or limb paralysis. One participant recalled, “In our hospital, which employs 80 specialists and 10 general practitioners, hardly anyone was initially willing to get vaccinated. The hospital director stepped in to facilitate the process by inviting 10 experienced senior doctors to receive the shot first, hoping this would motivate others to accept it more readily” (P7). Another stated, “The level of concern about side effects was so high that representatives from the medical and nursing staff requested the hospital head to be the very first person vaccinated. Only if he remained fine would the rest of the team follow” (P1 and P20). “Social media platforms were also affected. Video clips circulating on Telegram and WhatsApp depicted unusual reactions supposedly linked to COVID-19 vaccination in some individuals” (P2). A further participant observed, “Since healthcare workers

were selected as the initial group to receive the vaccine, many felt they had been singled out as test subjects to monitor the vaccine’s overall effects and potential side effects” (P18).

Vaccine supply

Participants indicated that once the COVID-19 vaccine formula was developed, only a limited number of countries would be able to produce it on a large scale, leading to intense competition for vaccine distribution across populations. Nations such as Iran, which face international sanctions, would encounter particular difficulties in securing adequate supplies. Vaccine supply emerged as a major category, with three subcategories: resource allocation for vaccine supply, vaccine availability, and the diversity and comprehensiveness of the vaccine.

Allocation of resources for vaccine supply

Participants held the view that the government bears a fundamental duty to protect and enhance public health; therefore, it must fully utilize all available national resources to ensure timely access to high-quality vaccines. One participant noted, “The effectiveness of a health system’s governance can be judged by how it responds to serious threats to population health” (P8). Another added, “Prompt delivery of vaccines could significantly slow the spread of the pandemic and lower death rates within the country” (P21 and P11). A further participant explained, “Mobilizing all available assets — including political, diplomatic, and financial resources, along with appropriate budget allocations to negotiate contracts with vaccine producers — can greatly lessen the impact of the pandemic and restore calm to society” (P21).

Vaccine availability

Participants reported that “during the early stages of the vaccination campaign, health centers received only a small number of vaccine doses for administration. Each allocation to national vaccination sites was insufficient to meet the high demand from applicants. However, by the second year of the program, most individuals had received their injections, and shortages became far less evident” (P4, P5, P10). One participant described, “Only 200 doses of the Sinopharm vaccine were supplied, while those who had received Sputnik in the initial round were still awaiting official guidance from the ministry regarding the safety of mixing the two different vaccines.

The assigned quota for health centers proved clearly inadequate” (P2 and P13).

Diversity and comprehensiveness of the vaccine

Most participants identified the limited availability of COVID-19 vaccines in the country and the failure to meet public expectations as important ethical concerns in the national immunization effort. For instance, two participants observed, “During the first year of the campaign, there was no selection of different vaccines; due to limited production and supply, only one particular type was brought into the country at a time, leaving people with no alternative options” (P2 and P8). Another participant remarked, “Even with the existing restrictions on vaccine supply, the allocated quota was not enthusiastically accepted. People actively sought out their preferred vaccines” (P2). Yet another stated, “The specific type of vaccine that was imported did not match what the public had hoped for, leading to a substantial portion of the imported doses remaining unused” (P13 and P11).

Fairness

Vaccine fair distribution

Participants expressed that “when individuals sense that the health system treats the entire population equally without any favoritism, it fosters feelings of tranquility and fairness” (P14). Another participant commented, “During the first year, widespread fear of the coronavirus and its life-threatening consequences led many people to criticize the shortage of vaccines and delays in delivery” (P9). A different participant added, “Not all provinces received vaccine quotas proportional to their population size, which raised doubts about the equitable distribution of the various vaccine types that had been announced” (P17).

Vaccination prioritization

Many participants approved of the strategy for prioritizing vaccination by age and professional role. One participant recalled, “In the first year, vaccine quotas were initially set aside for healthcare workers and then gradually extended to the general population through systematic prioritization of target groups such as older adults (based on birth year, age, presence of underlying conditions, and severity of illness)” (P22). Some participants noted that “in a pandemic like COVID-19, where no effective treatment or medication exists to control or cure the disease, careful planning is required

to distribute the scarce supply of vaccine to priority groups according to established scientific and ethical standards” (P3). “When the public perceives that access to the vaccine is free from discrimination, and that prioritization relies solely on expert scientific judgment, everyone can receive their dose within clearly defined timeframes” (P14).

Prioritization of the vulnerable populations of society

Most participants stressed the importance of giving special attention to vulnerable groups in society when providing protection and immunity against COVID-19. They explained, “As various studies and media reports indicated, certain individuals faced higher risks of severe or fatal outcomes from the coronavirus due to underlying health conditions, making it essential for the government to prioritize them” (P8 and P3). Another participant stated, “Patients with comorbidities or incurable diseases who required immediate protection were granted earlier access to the vaccine” (P22). “During the first year of the pandemic, a considerable number of people with special medical conditions became infected or needed hospitalization because vaccination coverage for vulnerable populations fell well below expectations” (P19).

The significance of autonomy

Analysis of the data gathered from both individual and group interviews revealed that participants placed strong emphasis on the principle of autonomy. This category consisted of three subcategories: patient autonomy, community autonomy, and health provider autonomy.

Autonomy of the patient (equal respect)

Participants observed that “it is unjust to claim that individuals own their lives completely and can therefore refuse vaccination and remain unprotected” (P1). “Since controlling the disease depends on achieving immunity across the entire population, it is not acceptable for people to treat vaccination as a purely personal choice” (P7). “Individual freedom and the right to decide should be honored only when the consequences of that decision affect solely the person involved and do not endanger others” (P5). Another participant added, “I support mandatory vaccination in principle, yet individuals should still have the freedom to select which type of vaccine they receive rather than being compelled to accept only one specific option” (P17).

Autonomy of the community

One participant explained that “when a contagious disease spreads, its harmful consequences impact the whole society; therefore, the collective needs of the community must be respected” (P1). He stressed that public health must take precedence over individual preferences. Other participants echoed this view. For example, “The COVID-19 pandemic inflicted substantial economic and social damage on various segments of society and severely disrupted the national education system. Achieving high vaccination coverage can help prevent such widespread losses” (P13). Another participant noted that “vaccination represents a shared social responsibility. If people are left entirely free to accept or reject it, the health of the entire community will be placed at risk” (P12).

Autonomy of healthcare providers

Most participants concurred that the government should introduce a combination of incentives and penalties to achieve the highest possible vaccination rates nationwide. They reasoned that the vaccine can effectively control the coronavirus only when a large proportion of the population is immunized. Therefore, authorities should impose reasonable restrictions on social services for individuals who consciously refuse vaccination (P14). Another participant suggested, “The government could pass legislation requiring those who avoid vaccination and subsequently transmit the disease to bear the full cost of their treatment without any insurance assistance” (P22).

Accountability

Another key outcome from the data analysis was the theme of accountability. This category encompassed three sub-categories: reporting correct information, reporting vaccine side effects, and public trust and acceptance.

Reporting correct information

One participant remarked, “Online platforms were highly deceptive. Photos and video clips were alleging that officials received foreign vaccines while urging the public to use domestically produced ones” (P5). Participants further emphasized that “when a country’s health system focuses on achieving immunity through vaccination, it must deliver complete, truthful, and dependable information to the public” (P15). “In addition to constantly highlighting the benefits of the vaccine in

the media, physicians and specialists should openly discuss potential side effects and how to manage them so that people can place genuine trust in the authorities” (P18). “By supplying accurate and timely information, doctors can guide citizens toward making informed decisions” (P3). “To counter the misleading influence of cyberspace, the Ministry of Health needs to play a more proactive role” (P16). Unfortunately, online spaces often spread confusion, and the government did not respond with sufficient transparency (P14).

Reporting vaccine side effects

Participants noted that public anxiety about vaccine side effects — sometimes amplified by images and reports circulating in both social media and official channels — represented a major societal concern. Many believed that “side effects are deliberately downplayed or concealed to avoid discouraging people from getting vaccinated, even though such withholding of information is neither ethical nor professional” (P1). “Information about vaccine reactions was not communicated clearly, apparently to prevent public worry” (P16). “Individuals who attended health centers or inquired about side effects often received inadequate or unconvincing responses in the short term. A large number suspected that the data they provided would later be used for research purposes or for the personal advantage of those in charge” (P23).

Public trust and acceptance

Participants felt that the entirely new character of the disease and its rapid global spread, combined with intense worldwide media coverage, generated widespread fear and apprehension in society. Conflicting reports about the pandemic and inconsistent government policies on vaccination further eroded public confidence. On the one hand, the media frequently emphasized the risks associated with foreign vaccines while remaining silent about the possible side effects of domestically produced vaccines (P11). “On the other hand, strict lockdowns were imposed to interrupt transmission chains, yet travel remained unrestricted, and roads stayed open across the country” (P1). “Failing to disclose the true adverse effects of the vaccine and not obtaining international approval for locally manufactured vaccines raised serious ethical issues” (P16). Participants concluded that “to carry out the vaccination program successfully, the government must transparently explain the stages of vaccine development, provide valid certifications, and address public concerns directly. Trust

should be built through honest communication with society rather than relying solely on coercive measures” (P21).

The current investigation identified five primary categories of ethical considerations related to COVID-19 vaccination: “safe and standard vaccine production”, “vaccine supply”, “fairness”, “significance of autonomy”, and “accountability”. According to the findings, adherence to scientific and ethical protocols, vaccine efficacy and cost-benefit, and the lack of serious negative health impacts emerged as key ethical aspects of safe and standard vaccine production. In this study, healthcare service providers noted that although manufacturing a reliable and safe vaccine is essential, references to emergency use authorizations, the innovative nature of the vaccine technology, and uncertainty surrounding long-term side effects reflected widespread societal apprehension. Safe and standard vaccines that have undergone proper scientific evaluation play a crucial role in protecting public health [31, 32]. Naturally, their value hinges on demonstrated effectiveness, minimal side effects, and the absence of life-threatening reactions [33-35]. Vaccines are specifically developed to prevent infectious diseases and to strengthen population-level immunity. Consequently, members of society should not be exposed to severe adverse reactions from immunization [36, 37]. Healthcare providers need to be reminded that the overall benefits of public health interventions outweigh any potential drawbacks for the community [38].

The findings of Pourshahri *et al.* [39] indicated that fear of vaccine side effects, concerns about vaccine ingredients, and insufficient knowledge of its effectiveness were associated with refusal of COVID-19 vaccination. Gaduth’s study revealed that 35% of healthcare workers expressed concern about possible side effects of the COVID-19 vaccine [40]. In Qattan’s research, 26.73% of respondents declined vaccination due to fear of harmful reactions [41].

As the present results demonstrate, the allocation of resources for vaccine supply, vaccine availability, and the diversity and comprehensiveness of vaccine options constitute important ethical considerations under the theme of vaccine supply. Service providers in this study emphasized that it is the government’s responsibility to allocate the necessary resources to produce the vaccines society requires. References to the existence of authentic vaccines, individuals’ right to choose their preferred vaccine type, and the inability to do so due to limited

options highlighted the importance of ensuring sufficient variety and completeness in vaccine availability. Naturally, once an effective vaccine formulation is identified, only a few countries can manufacture it at scale, forcing other nations to import supplies; therefore, establishing reliable mechanisms for public access to vaccines becomes critical [22]. This process serves as an indicator of effective health system governance.

As the findings revealed, equitable vaccine distribution, a fair prioritization process, and prioritizing vulnerable groups within society represent core ethical considerations under the theme of fairness. In fair vaccine allocation, the ethical principles of justice and utility come into play. The principle of justice directs health policymakers to equitably distribute vaccines to all members of society. In contrast, the principle of utility encourages the use of resources to deliver the greatest benefit to the population [42]. In certain countries, the proposed vaccine prices may place them beyond the reach of many vulnerable individuals. When vaccination costs are borne directly by citizens, affordability issues can arise, hindering access for low-income, at-risk populations [22]. Therefore, governments must provide support for vulnerable groups. Immunizing these populations not only reduces mortality rates but also helps society achieve a foundational level of herd immunity.

As the present study indicated, patient autonomy (equal respect), community autonomy, and healthcare providers’ autonomy are central ethical considerations within the theme of autonomy. In contemporary medicine, patient autonomy — understood as respect for personal independence and individual freedom — stands as a fundamental principle. Many core elements of medical ethics, including informed consent, respect for privacy, confidentiality, and personal integrity, are grounded in this principle [43, 44]. In any healthcare decision within the health system, multiple stakeholders participate (patient, society, and service provider), each holding legitimate claims to autonomy [22]. According to the principle of individual autonomy, every person has the right to receive adequate information about the vaccine and to make a personal decision based on their own health status. However, during epidemics of contagious diseases that cause widespread societal harm, it becomes necessary to balance, or temporarily adjust, the principle of autonomy in favor of equal respect for collective well-being. According to medical ethics philosophy, autonomy is respected only to the extent that

it does not cause harm to others. Measures such as quarantining individuals and contact tracing shift the emphasis from personal autonomy to the principle of societal benefit (community autonomy). Vaccination increases population immunity, thereby lowering infection risk and mortality rates during a pandemic. The COVID-19 outbreak inflicted serious damage on both individual and socio-economic well-being, and immunization can help prevent such harm. Of course, for the vaccine to be effective, a substantial portion of the population must be vaccinated; hence, governments and policymakers may deem it essential. In this sense, vaccination can be viewed as a moral obligation, under the assumption that widespread refusal would jeopardize societal safety (deontological reasoning). Protecting the community can justify limiting individual autonomy. The more severe the potential harm to society, the more justifiable such measures appear (utilitarianism) [39].

According to ethical principles, the health system is responsible for implementing preventive measures to advance public health and protect society from infectious diseases that pose major threats. Stakeholders in the health system must seek balanced solutions that safeguard both individual and collective health. Pourshahri *et al.* [39] found that 9% of vaccinated individuals cited respect for others' rights as a reason for accepting the COVID-19 vaccination. In Bell's study, protecting oneself and others was identified as the most frequent motivation for accepting the COVID-19 vaccine [45]. Similar figures in other studies on public attitudes toward COVID-19 vaccination ranged from 54.7% to 65.5% [46, 47].

In view of the current findings, it can be concluded that delivering accurate information to the public, transparently reporting vaccine side effects, and building public trust are essential elements of governmental accountability. Rebuilding confidence and maintaining open communication with society can occur through multiple channels to address concerns and correct misunderstandings. Clearly informing the population about the dangers of refusing vaccination, the risk of infecting vulnerable groups, and the potential rise in mortality rates proves particularly beneficial [48, 49]. Insufficient knowledge remains a primary obstacle to achieving broad vaccination coverage [50]. Reporting vaccine side effects sometimes constitutes a central public concern [51], especially when false or exaggerated reports circulate. The health system, including frontline providers, is expected to offer trustworthy medical

guidance and quality public health services. The presence of unverified, rapidly changing, or poorly managed research-based information during the pandemic heightened mistrust. Certain studies among healthcare workers identified a lack of transparency in vaccine-related information as a leading cause of vaccine avoidance [40]. The existing literature indicates that public hesitation often stems from an inadequate understanding of vaccine composition and effectiveness, which, in turn, undermines confidence in immunization programs [39]. In essence, convincing communities to embrace vaccination requires solid, evidence-based proof of the vaccine's safety and efficacy. This perspective closely aligns with the experiences shared by participants in this study.

Conclusion

In this research, safe and standard vaccine production, vaccine supply, respect for autonomy, and responsiveness to public concerns were identified as the primary ethical considerations associated with COVID-19 vaccination. Enhancing public awareness and knowledge of vaccine effectiveness at the national level, along with efforts to alleviate fears of side effects, requires strategic planning and substantial investment at the highest levels of government. Furthermore, initiatives should focus on reinforcing individuals' motivation to protect others through personal vaccination and on improving the dissemination of accurate information via social networks and media platforms.

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Ethics Statement: Ethical approval for the study was obtained from the Ethics Committee at Mazandaran University of Medical Sciences. The ethics code allocated to this study is (IR.MAZUMS.REC.1401.11796). All participants signed an informed consent form stating that they understood the nature and purpose of the research and that they agreed to their interview being recorded. The principle of confidentiality was adhered to by avoiding distortion of participants' statements and by using the

same phrase when writing the research findings. Also, the interview was conducted individually so participants could express their lived experiences more conveniently. To maintain the participants' confidentiality about the information provided, an identification number was assigned to each interviewee. All methods were carried out in accordance with relevant guidelines and regulations.

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