

Child vulnerability to public health problems. A bioethical approach

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Abstract

Child vulnerability in the context of public health problems constitutes a first-order ethical challenge requiring interdisciplinary analysis from bioethics. This article examines the structural, relational and dynamic dimensions of the vulnerability of children and adolescents facing health crises, adverse social determinants and climate emergencies. Through a review of scientific literature indexed in SCOPUS, four problematic axes are identified: the tension between emerging autonomy and paternalistic protection; distributive injustice in the allocation of health resources; the systematic exclusion of childhood in research and public policies; and the intergenerational dimension of environmental crises. It is concluded that child vulnerability should not be conceived as an inherent and immutable condition, but as a social and political construction that demands bioethical responses guided by the principles of justice, equity and participation.

Keywords: child vulnerability, bioethics, public health, distributive justice, emerging autonomy, social determinants.

1. Introduction

Child vulnerability to public health problems constitutes a first-order ethical challenge requiring interdisciplinary analysis from bioethics. Unlike traditional conceptions that associated vulnerability exclusively with lack of autonomy or the inability to consent, recent theoretical developments propose a dynamic and relational understanding of this condition. Schweiger and Graf (2017) argue that children's vulnerability does not derive solely from their incomplete cognitive development, but also from the social and political structures that condition their exposure to risk and their access to protective resources.

This perspective shifts the focus from the individual toward the institutional and community contexts that produce or mitigate vulnerability, requiring an analysis that transcends the dichotomy between protection and autonomy. In the field of public health, this understanding implies that interventions must adapt not only to children's developmental capacities, but also to the structural conditions that amplify or attenuate their exposure to health hazards.

The COVID-19 pandemic constituted a paradigmatic scenario for examining the tensions between public health measures and children's rights. Verd (2023) argues that during the first waves of the pandemic, mandatory restrictions of freedom

were implemented without sufficient academic debate on their ethical implications for children. The absence of public deliberation about the costs that these measures imposed on the child population revealed a tendency to prioritize the interests of other age groups without adequately considering the principle of intergenerational justice. This invisibilization of childhood in the weighing of benefits and burdens constitutes an ethical failure that contemporary bioethics must address urgently. Various studies document that lockdown and school closure measures had minimal impact on the spread of the virus, while their negative consequences on children's mental and educational health were profound and lasting.

The exclusion of children from initial COVID-19 vaccination programs in countries such as Ghana raised ethical questions about the just distribution of scarce resources. Owusu (2023) argues that, although bioethical allocation models are based on principles of justice and beneficence, global inequalities in vaccine access left the child population in a position of avoidable risk. The author proposes that an equitable distribution for children should prioritize those with severe underlying health conditions and those in hospital environments, recognizing their greater clinical and social vulnerability. This analysis shows how resource allocation decisions reflect hierarchies of moral valuation

that frequently marginalize childhood. Bioethics has the responsibility to make these hierarchies visible and to propose normative frameworks that guarantee the equitable protection of the most vulnerable groups.

The tension between emerging autonomy and parental protection constitutes another central axis of the bioethical debate on child health. Morgan et al. (2021) analyze the vaccination of minors without parental consent, arguing that respecting the emerging autonomy of adolescents and promoting public health can be complementary rather than contradictory objectives. This position challenges traditional paternalism that completely subordinates the decisions of minors to the authority of their legal representatives. However, the implementation of this principle requires a careful evaluation of the maturity and understanding capacity of each minor, as well as safeguards that prevent coercion or unnecessary family conflict. The comparative analysis of informed consent regulation in minors reveals significant heterogeneity among jurisdictions and legal systems.

The structural determinants of health constitute an essential analytical framework for understanding how social and economic conditions shape child vulnerability. Garrity et al. (2025) examine the barriers to achieving equitable screening of adverse structural determinants of health in pediatric settings, noting that variability in assessment tools hinders data collection and resource allocation. The lack of psychometric validation of most of these tools complicates the systematic

identification of families requiring specific interventions. From a bioethical perspective, this instrumental deficiency perpetuates inequities by not translating the theoretical recognition of social determinants into concrete actions of distributive justice. Poverty, social isolation and persistent discrimination emerge as the main factors preventing the effective guarantee of the rights of childhood enshrined in the Convention on the Rights of the Child.

This article is organized around a conceptual framework on dynamic and relational vulnerability, followed by the analysis of specific problematic axes: the COVID-19 pandemic, distributive justice, emerging autonomy, structural determinants, the climate crisis, participation in research, sexual violence, public policies, bioethics training and comparative regulation. Finally, conclusions oriented toward strengthening a bioethics committed to children's rights are presented.

2. Conceptual framework: dynamic and relational vulnerability

Child vulnerability is not a homogeneous or static condition. Schweiger and Graf (2017) propose understanding it as a dynamic and relational reality, crossed by structural, relational and evolutionary dimensions. This perspective allows overcoming the dichotomy between protection and autonomy, and requires analyzing how institutions, policies and power relations configure the differential exposure of children and adolescents to health risks (See Table 1).

Table 1: Dimensions of child vulnerability in public health

Dimension.	Definition.	Bioethical implication.
Structural.	Social, economic, political and institutional conditions that expose childhood to risks and limit protective resources.	Requires distributive justice, equitable policies and accountability.
Relational.	Vulnerability emerges in relationships of dependency, care, power and community belonging.	Demands protection without annulling agency; family, institutional and state co-responsibility.
Dynamic.	Varies according to developmental stage, context, crisis and life trajectories.	Requires contextual and adapted assessments, not fixed labels.
Epistemic.	Exclusion of children from research, data and public deliberation.	Obliges ethical inclusion, participatory methodologies and epistemic justice.

Note. Own elaboration based on Schweiger and Graf (2017).

3. Bioethical Challenges in Child Health: Pandemic, Equity, Participation, and Intergenerational Justice

This section examines the bioethical challenges surrounding child health, focusing on the tensions between public health measures and children's rights during the COVID-19 pandemic, including restrictions, mental health impacts, and vaccination equity. It analyzes distributive justice in allocating scarce pediatric resources, the balance between emerging autonomy and parental protection in consent, and the structural determinants that perpetuate inequities. Furthermore, it addresses intergenerational justice in the context of the climate crisis, child participation in research

and policy, and the ethical complexities of responding to sexual violence through an intersectional lens. The discussion also underscores the importance of bioethics training for health professionals and the need for comparative regulatory frameworks that adapt universal principles to diverse sociocultural contexts. Ultimately, this analysis advocates for institutional mechanisms that represent children's interests in decision-making processes, ensuring that their protection is not subordinated to short-term political or economic priorities.

3.1. COVID-19 and childhood: restrictions, mental health and vaccination

The COVID-19 pandemic evidenced deep tensions between public health measures and children’s rights. Verd (2023) argues that mandatory restrictions of freedom were implemented without sufficient academic debate on their ethical implications for children. The absence of public deliberation about the costs imposed on the child population revealed a tendency to prioritize the interests of other age groups without adequately considering the principle of justice intergenerational. This invisibilization constitutes an ethical failure that contemporary bioethics must address urgently.

Various studies document that lockdown and school closure measures had minimal impact on the spread of the virus, while their negative consequences on children’s mental and educational health were profound and lasting. Bond and McNicholas (2023) document the significant increase in depression, eating disorders and anxiety in the pediatric population, especially in socioeconomically

vulnerable groups. These findings raise a fundamental bioethical question: under what criteria is the imposition of disproportionate burdens on a population group that obtains marginal benefits from restrictive measures justified? The answer requires incorporating principles of proportionality and equity in the evaluation of health policies, as well as mechanisms for continuous monitoring of adverse effects on child health.

The exclusion of children from initial COVID-19 vaccination programs in countries such as Ghana generated ethical questions about the just distribution of scarce resources. Owusu (2023) argues that, although bioethical allocation models are based on principles of justice and beneficence, global inequalities in vaccine access left the child population in a position of avoidable risk. The author proposes that an equitable distribution for children should prioritize those with severe underlying health conditions and those in hospital environments, recognizing their greater clinical and social vulnerability (See Tablet 2).

Table 2: Ethical tensions in the COVID-19 pandemic for childhood

Scope.	Tension.	Ethical risk.	Bioethical response.
Restrictions of freedom.	Collective protection vs. child costs.	Invisibilization of burdens on children.	Public deliberation and proportionality.
School closure.	Reduction of contagion vs. mental health and education.	Latrogenic and unequal harm.	Monitoring of adverse effects and equity.
Initial vaccination.	Scarce resources vs. child exclusion.	Global inequity and avoidable risk.	Justified clinical and social prioritization.
Mandates and consent.	Public health vs. family and emerging autonomy.	Coercion or conflicts.	Evidence, deliberation and safeguards.

Note. Own elaboration based on Alahmad (2023), Bond and McNicholas (2023), Owusu (2023) and Verd (2023).

3.2. Distributive justice and allocation of scarce resources

Public health policies for children require robust ethical frameworks to guide resource allocation and the prioritization of interventions in contexts of scarcity. The analysis of distributive justice in pediatric health reveals tensions between utilitarian approaches that maximize aggregate benefit and perspectives that prioritize the most vulnerable. In pandemic or health emergency situations, these tensions intensify and demand transparent deliberative procedures that incorporate the voices of affected communities.

Owusu (2023) shows how resource allocation decisions reflect hierarchies of moral valuation that frequently marginalize childhood. Bioethics has the responsibility to make these hierarchies visible and to propose normative frameworks that guarantee the equitable protection of the most vulnerable groups (See Tablet 3). The principle of intergenerational justice emerges as an articulating axis of ethical responsibilities toward childhood, demanding institutional mechanisms that represent the interests of those who cannot yet participate in decision-making processes (Celie et al., 2024).

Table 3: Criteria of distributive justice in pediatric health

Criterion.	Emphasis.	Limit.	Bioethical contribution.
Utilitarian.	Maximize aggregate benefit.	Can marginalize small or dependent groups.	Requires correction by equity.
Priority to the most vulnerable.	Protect those facing greatest risk.	Difficult to operationalize vulnerability.	Requires dynamic and contextual definitions.
Intergenerational equity.	Consider future generations.	Lack of political representation.	Institutional representation mechanisms.
Deliberative participation.	Incorporate affected voices.	Power asymmetries.	Transparency and accountability.

Note. Own elaboration based on Celie et al. (2024) and Owusu (2023).

3.3. Emerging autonomy, consent and protection

The tension between emerging autonomy and parental protection constitutes another central axis of the bioethical debate on child health. Morgan et al. (2021) analyze the vaccination of minors without parental consent, arguing that respecting the emerging autonomy of adolescents and promoting public health can be complementary rather than contradictory objectives. This position challenges traditional paternalism that completely subordinates the decisions of minors to the authority of their legal representatives. However, the implementation of this principle requires a careful evaluation of the maturity and understanding capacity of each minor, as well as safeguards that prevent coercion or unnecessary family conflict.

The regulation of informed consent in minors reveals significant heterogeneity among jurisdictions that reflects divergent conceptions of autonomy and vulnerability. Mullins et al. (2021) document that, while in the United States and Europe legislation on pediatric clinical research is more developed, in countries such as India, China and Kenya significant legal gaps persist. In cultural contexts where autonomy is conceived as a collective right rather than an individual one, decision-making about child health involves the extended family and the community. This normative diversity raises questions about the universality of bioethical principles and the need to adapt them to specific sociocultural contexts without sacrificing the fundamental rights of childhood. Global bioethics offers a framework to navigate these tensions without falling into relativisms that justify the violation of rights (See Table 4).

Table 4: Emerging autonomy, consent and protection in minors

Model.	Conception of the minor.	Risk.	Condition to implement it.
Paternalistic.	Passive dependent subject.	Annuls emerging agency.	Critical revision.
Protection with participation.	Developing subject with rights.	Excessive protection.	Evaluation of maturity and context.
Emerging autonomy.	Adolescent with growing capacity.	Coercion or family conflict.	Safeguards and accompaniment.
Culturally adapted consent.	Individual or collective decision.	Relativism that violates rights.	Universal framework of children's rights.

Note. Own elaboration based on Alahmad (2023), Morgan et al. (2021) and Mullins et al. (2021).

3.4. Structural determinants and equity in pediatric health

The structural determinants of health constitute an essential analytical framework for understanding how social and economic conditions shape child vulnerability. Garrity et al. (2025) examine the barriers to achieving equitable screening of adverse structural determinants of health in pediatric settings, noting that variability in assessment tools hinders data collection and resource allocation. The lack of psychometric validation of most of these tools complicates the systematic identification of families requiring specific interventions.

From a bioethical perspective, this instrumental deficiency perpetuates inequities by not translating the theoretical recognition of social determinants into concrete actions of distributive justice. Poverty, social isolation and persistent discrimination emerge as the main factors preventing the effective guarantee of the rights of childhood enshrined in the Convention on the Rights of the Child. Therefore, bioethics must articulate responses that integrate the principle of beneficence with respect for the autonomy of minors and the obligation of justice toward historically marginalized populations.

3.5. Climate crisis, biodiversity and intergenerational justice

Climate change and biodiversity loss represent existential threats that disproportionately affect the child population. Williams et al. (2023) argue that more than five hundred million children live in areas vulnerable to extreme climate events and that, without immediate action, the health of current and future generations will be compromised. These authors propose a three-dimensional ethical framework that integrates the medical duty toward individual patients, the public health perspective and a collective obligation toward future generations. This third dimension, frequently neglected in traditional bioethical analyses, is essential for addressing crises whose temporal scale transcends conventional political horizons.

The climate crisis also constitutes a children’s rights crisis that requires responses from multiple ethical dimensions, recognizing that climate change is regressive in its nature and affects more severely those who contributed least to the destruction of planetary health (Seyednasseri, 2024). Intergenerational justice in public health requires institutional mechanisms that represent the interests of future generations in current decision-making processes.

Seyednasseri (2024) examines state obligations to protect children’s right to health in the context of the climate crisis, arguing that a persistent gap exists between legal commitments and domestic practice. The author proposes strengthening monitoring and adjudication mechanisms sensitive to climate harms on child health, as well as incorporating child-centered considerations into mitigation and adaptation strategies.

3.6. Child participation in research and policies

The participation of children and adolescents in biomedical research raises specific ethical dilemmas that require a careful balance between protection and recognition of their agency. Murano (2024) examines how sociocultural norms and power dynamics in pediatrics undermine the moral status of minors and challenge the political equality that

should characterize their participation in decisions affecting them. Despite growing recognition of the specific rights of childhood, practices persist that treat them as objects of research rather than as subjects with emerging capacities for deliberation. Overcoming this tension requires developing participatory methodologies that recognize children’s competencies without disregarding their protection needs.

The review of ethical guidelines and regulations for research with minors reveals an evolution from conceptions that considered them passive subjects toward models that recognize them as active participants, although deeply rooted assumptions about their inherent vulnerability persist (Vergès, 2025). Research with children in particularly vulnerable situations, such as those in protection systems or with trauma experiences, requires additional safeguards that minimize the risk of causing harm. Buchanan (2024) analyzes the ethical considerations for interviewing vulnerable children in longitudinal research, highlighting the need to adopt operational definitions of vulnerability that capture their susceptibility to coercion and their limited capacity to understand the implications of participating in a study. Strategies to minimize harm include adapting language, creating safe environments and providing psychological support during and after the interviews.

The exclusion of children from clinical trials and pharmacological research has generated an evidence gap on the safety and efficacy of medical interventions in pediatric populations, perpetuating a form of epistemic vulnerability (Binik, 2024). Qualitative research with children who have experienced trauma requires methodologies that respect their agency and minimize the risk of revictimization. Huard et al. (2024) explore the tensions between artistic and hermeneutic methods in research with vulnerable children, underscoring the importance of creating safe spaces where minors can express their experiences without feeling pressured. These authors argue that children’s participation in research should not be conceived as an end in itself, but as a carefully designed process that prioritizes their emotional and psychological well-being (See Table 5).

Table 5: Intergenerational justice and child participation in public health

Axis.	Problem.	Bioethical strategy.
Representation of future interests.	Children and future generations without political voice.	Institutional representation mechanisms.
Climate crisis.	Disproportionate and regressive harms.	State obligations, mitigation and adaptation.
Pediatric research.	Exclusion and epistemic vulnerability.	Ethical inclusion and participatory methodologies.
Structural determinants.	Poverty, isolation and discrimination.	Validated screening and equitable follow-up.
Professional training.	Paternalism and bioethical deficit.	Curricula in pediatric and global bioethics.

Note. Own elaboration based on Binik (2024), Buchanan (2024), Celie et al. (2024), Garrity et al. (2025), Huard et al. (2024), Murano (2024), Seyednasseri (2024), Vergès (2025) and Williams et al. (2023).

3.7. Sexual violence, intersectionality and rights

Sexual violence against children and adolescents constitutes an extreme manifestation of rights violation that transcends the borders of public health to become a problem of social justice and bioethics. Notification and institutional response systems face significant challenges in guaranteeing effective protection of victims, particularly in contexts where reproductive health services are limited or stigmatized. Bioethics must articulate responses that integrate the principle of beneficence with respect for the autonomy of minors and the obligation of justice toward historically marginalized populations. This implies addressing not only the immediate consequences of violence, but also the structural determinants that perpetuate it.

The intersectionality of vulnerabilities, as evidenced by cases of children of adolescent mothers, reveals overlapping layers of exclusion that ethical research norms and public policies do not always adequately capture (Vergès, 2025). Therefore, the protection of childhood from sexual violence requires coordinated institutional responses, sensitive to gender, age and social conditions, that avoid revictimization and guarantee access to justice and reparation.

3.8. Public policies, bioethics training and mental health

The training of health professionals in bioethical competencies constitutes a fundamental strategy for translating theoretical principles into institutional practices that effectively protect childhood. Medical and nursing curricula frequently devote scarce attention to the ethical dimensions of pediatric care, particularly regarding communication with minors, the evaluation of their decision-making capacity and the management of conflicts with families. This formative deficiency perpetuates paternalistic practices that disregard children's emerging agency and perpetuate their institutional vulnerability. Strengthening bioethics education in pediatrics is a necessary condition for transforming the organizational cultures that reproduce these dynamics.

Global bioethics, as a paradigm that integrates diverse perspectives and promotes collaboration between clinicians and bioethicists, offers a promising framework for addressing these formative and structural challenges (Celie et al., 2024). Likewise, the mental health crisis in children and adolescents during the COVID-19 pandemic constitutes a paradigmatic example of how public health measures can generate unforeseen iatrogenic consequences. Bond and McNicholas (2023) document the significant increase in depression, eating disorders and anxiety in the pediatric population, especially in socioeconomically vulnerable groups. These findings require incorporating principles of proportionality and equity in the evaluation of health policies, as well as mechanisms for continuous monitoring of adverse effects on child health.

3.9. Comparative regulation, clinical trials and intergenerational justice

The regulation of informed consent in minors reveals significant heterogeneity among jurisdictions that reflects

divergent conceptions of autonomy and vulnerability. Mullins et al. (2021) document that, while in the United States and Europe legislation on pediatric clinical research is more developed, in countries such as India, China and Kenya significant legal gaps persist. In cultural contexts where autonomy is conceived as a collective right rather than an individual one, decision-making about child health involves the extended family and the community. This normative diversity raises questions about the universality of bioethical principles and the need to adapt them to specific sociocultural contexts without sacrificing the fundamental rights of childhood.

The exclusion of children from clinical trials during health emergencies raises a dilemma between protecting them from unknown risks and guaranteeing their access to potentially beneficial interventions. Alahmad (2023) conducts a systematic review of the ethical challenges involved in COVID-19 vaccine mandates for children, identifying tensions between the principle of beneficence and respect for family autonomy. The author concludes that pediatric vaccination policies must be based on solid evidence on safety and efficacy, as well as on deliberative processes that incorporate the perspectives of families and communities. Bioethics has the responsibility to facilitate these processes and to guarantee that decisions do not reproduce preexisting inequities or deepen gaps in access to essential services.

Finally, intergenerational justice in public health requires institutional mechanisms that represent the interests of future generations in current decision-making processes. Seyednasseri (2024) examines state obligations to protect children's right to health in the context of the climate crisis, arguing that a persistent gap exists between legal commitments and domestic practice. The author proposes strengthening monitoring and adjudication mechanisms sensitive to climate harms on child health, as well as incorporating child-centered considerations into mitigation and adaptation strategies. Bioethics must contribute to designing these mechanisms and to guaranteeing that the protection of childhood is not subordinated to short-term political or economic interests.

4. Conclusions

Child vulnerability to public health problems requires a profound rethinking of traditional bioethical frameworks that have conceived children as passive subjects of protection. Contemporary theoretical developments, such as dynamic and relational vulnerability, offer more adequate conceptual tools to capture the complexity of childhood experiences in contexts of health and environmental crises. The reviewed evidence demonstrates that the exclusion systematic exclusion of childhood from deliberative processes and resource allocation decisions constitutes a recurrent ethical failure that perpetuates structural inequities. Overcoming this exclusion requires not only institutional reforms, but also a transformation in professional cultures and in the hierarchies of moral valuation underlying public health policies.

The COVID-19 pandemic, the climate crisis and structural inequalities in child health share a common feature: the tendency to invisibilize the costs that collective decisions impose on the most vulnerable groups. Children, due to their inherent dependency and limited capacity for political participation, are particularly susceptible to this invisibilization. Bioethics has the responsibility to counteract this tendency through the promotion of participatory methodologies, the incorporation of the intergenerational perspective in deliberation and the development of normative frameworks that guarantee the equitable protection of childhood. Intergenerational justice, emerging autonomy and dynamic vulnerability constitute articulating axes of a bioethics committed to children's rights.

Building public health systems that do not reproduce the inequities they seek to address requires a sustained commitment to the bioethical training of health professionals, participatory research with children and adolescents, and the design of evidence-based policies that prioritize equity. Child vulnerability is not an inevitable condition, but the result of human decisions that can and must be transformed. Bioethics, in its global and collaborative dimension, offers a privileged framework for articulating these transformations, integrating diverse perspectives and promoting collaboration among clinicians, researchers, policymakers and communities. Only through this collective effort will it be possible to guarantee that childhood occupies the place it deserves in the weighing of values and priorities that characterizes every public health decision.

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