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Structural Scarcity and the Bioethics of Priority Setting: A Structural Moral Ecology Framework

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Research Article

Keywords: priority setting, resource allocation, structural scarcity, structural sorting, Structural Moral Ecology, African relational ethics, distributive justice, global health justice, radiotherapy

Posted Date: November 17th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11419562/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Healthcare priority setting under structural scarcity involves more than distributing limited resources. Institutional arrangements also shape who can access care, remain within treatment pathways, and benefit from available interventions. This paper develops Structural Moral Ecology (SME) as a normative framework for evaluating these conditions and their implications for distributive justice.

Methods

The paper employs conceptual and normative analysis, bringing Ecological Adverse Selection Theory into conversation with African relational ethics, ecostructural approaches to health ethics, and established theories of distributive and procedural justice. It distinguishes structural scarcity, understood as enduring conditions constraining the provision and use of care, from structural sorting, the mechanisms through which institutional arrangements distribute opportunities and burdens. The framework is applied to a constructed radiotherapy prioritisation case.

Results

The analysis establishes a distinction between justifying an immediate allocation decision and justifying the institutional conditions under which that decision becomes necessary. Although established allocation frameworks can address structural injustice, their application to particular decisions may leave institutional responsibilities insufficiently examined. Structural disadvantage may warrant accommodation, monitoring, escalation, or institutional remedy without automatically justifying a change in immediate allocation priority. The framework identifies three distinct normative judgements: duty attribution, duty specification, and duty prioritisation. It also develops an institutional capacity obligation connecting defensible decisions under existing constraints with continuing responsibility for fairer allocation conditions.

Conclusions

Structural Moral Ecology extends ethical assessment beyond the immediate distribution of scarce resources to the institutional responsibilities that persist after an allocation decision. By connecting allocation justice with continuing institutional accountability, it offers a framework for evaluating both the defensibility of present decisions and the conditions shaping access to care over time.

Clinical Trial Registration

Not applicable

1. Introduction: Priority Setting Under Structural Scarcity

Healthcare systems operating under resource constraints face decisions about which patients should receive treatment, when treatment should be provided, and which needs cannot presently be met. Such decisions are especially consequential where shortages of infrastructure, workforce, financing, and reliable supply constrain both the availability of care and the ability of patients to benefit from it. Radiotherapy illustrates this problem. It is an essential component of cancer treatment, yet access remains uneven across countries, with substantial shortfalls in many low- and middle-income countries (Atun et al., 2015).

In settings where demand exceeds available treatment capacity, clinicians and institutions must establish priorities among competing claims. The ethical quagmire extends beyond the fact that some patients must wait: the conditions producing those waits may also shape who reaches treatment, who can sustain it, and who bears the greatest consequences when services fail. Distance, transport costs, work obligations, caregiving responsibilities, treatment schedules, and institutional procedures can affect access and continuity. A formally open service may therefore remain practically inaccessible to some patients.

Research on radiotherapy prioritisation in Rwanda illustrates the complexity of making allocation decisions under severe constraints. DeBoer et al. (2024) found that clinicians considered a range of factors, including curability, waiting time, palliative benefit, age, and non-clinical considerations. Their study documents disagreement about the role that some non-clinical factors should play and the difficulty of establishing priorities in the absence of explicit, widely accepted procedures. These findings demonstrate the importance of ethically defensible allocation criteria. They also invite a further question: *how should priority setting be evaluated when the circumstances in which choices are made are themselves part of the problem?*

A related challenge appears in the allocation of renal replacement therapy in South Africa. Moosa et al. (2016) used an Accountability for Reasonableness (A4R) approach to redesign patient selection and argued that the resulting process was more equitable and ethically defensible. Their work illustrates the value of stakeholder engagement, transparent rationales, and fair procedures. It also raises a broader issue for priority-setting ethics: merely enhancing the legitimacy of selection procedures leaves unresolved the deeper questions of how institutional arrangements govern access to treatment and distribute the burdens of scarcity.

This paper argues that conventional procedural and distributive frameworks remain indispensable to just priority setting, but their application can be incomplete when immediate allocation decisions are considered apart from the structural processes that shape access, treatment continuity, and the available options. Established theories can address structural injustice, yet an allocation decision and an

assessment of the institutional conditions producing recurrent scarcity remain distinct, interconnected tasks. A comprehensive ethical assessment requires both.

To develop this argument, the paper brings Ecological Adverse Selection Theory (EAST) into conversation with Structural Moral Ecology (SME), African relational ethics, and ecostructural approaches to health ethics. EAST explains how institutional arrangements can systematically disadvantage people whose circumstances do not fit the assumptions built into a service (Chingarande, 2026). SME provides the normative framework for evaluating the responsibilities generated by such arrangements. Distributive and procedural justice continue to constrain immediate allocation decisions.

The paper's central proposition is that the justification of an extant allocation decision does not discharge the obligations generated by the institutional conditions under which that decision becomes necessary. *The argument proceeds by distinguishing structural scarcity from structural sorting, examining the contribution and limits of allocation-focused analysis, establishing SME's normative foundations, and applying the framework to a constructed radiotherapy case. The framework distinguishes three normative judgements—duty attribution, duty specification, and duty prioritisation—which are previewed here and developed in* Section 4.2.

2. Structural Scarcity and Structural Sorting

2.1 Distinguishing Allocative Scarcity and Structural Scarcity

Healthcare scarcity takes different forms. Some shortages are temporary and can be managed within existing institutional arrangements. Others arise within enduring conditions that constrain the provision, accessibility, or sustained use of care. These forms can coexist: a clinician may face an immediate shortage of treatment slots within a health system whose capacity limitations have persisted for years.

This paper uses *Allocative Scarcity* to describe the immediate problem of distributing a limited resource among competing claims. *Structural Scarcity* refers to enduring institutional and material conditions that constrain the availability of care or the ability to access and benefit from it. The distinction is analytical rather than absolute. It does not imply that allocative scarcity is always temporary, that structural scarcity must affect every sector, or that persistent scarcity necessarily proves institutional wrongdoing.

Structural scarcity emerges from a constellation of factors, including underinvestment, workforce shortages, geographic constraints, supply-chain dependencies, political choices, and institutional failures. Its existence alone, however, establishes neither its moral legitimacy nor the acceptability of its consequences. Ethical scrutiny must penetrate the conditions that produce and perpetuate scarcity, identify whose access is systematically compromised, distinguish unavoidable constraints from preventable and unjustifiable disadvantage, and determine which actors bear the responsibility and possess the authority to intervene.

A diagnosis of structural scarcity must therefore distinguish the persistence of a constraint from its explanation and normative evaluation. A shortage can be enduring without being wholly avoidable by a particular institution. Conversely, a newly introduced policy or procedure can produce systematic disadvantage even before its effects have persisted for a long period.

These considerations are summarised in Table 1, which presents diagnostic dimensions for investigation rather than defining features of structural scarcity. The dimensions are tendencies that warrant empirical inquiry; they do not determine the moral assessment.

Table 1
Diagnostic dimensions of allocative and structural scarcity.

Dimension	**Allocative Scarcity (Tendency)**	**Structural Scarcity (Tendency)**
Duration	Temporary, episodic	Chronic, enduring
Scope	Discrete resource categories	May be concentrated in a particular service, facility, or treatment pathway
Capacity to reproduce constraints	Limited; shortage can be resolved within existing arrangements	High; arrangements continually reproduce the shortage
Predictability	Manageable through planning	May be predictable or uncertain; the key feature is the reproduction of the constraint
Causation	Resource limits within functioning systems	*Produced and maintained by institutional, economic, political, or material arrangements; the moral assessment of these arrangements is a separate question*

These are diagnostic dimensions for investigating structural scarcity, rather than definitive criteria. A well-governed institution may experience structural scarcity, while a poorly governed institution may face an episodic shortage. The distinction turns on the nature and reproduction of the constraint, independently of governance quality as such.

Structural scarcity warrants ethical scrutiny without establishing injustice by itself. Its moral significance depends on how the constraint is produced and sustained, whose access it compromises, which consequences are avoidable, and what responsibilities fall to actors capable of addressing them.

2.2 Structural Scarcity as a Conditioning Environment

Structural scarcity shapes the environment in which institutions distribute access, burdens, and opportunities to benefit from care. EAST explains how institutional arrangements can systematically favour people whose circumstances fit the assumptions built into service design while disadvantaging those whose circumstances do not (Chingarande, 2026).

For example, a service may assume that patients can travel repeatedly to a central facility, secure nearby accommodation, take time away from work, access reliable communication, and rely on caregivers. When these assumptions become embedded in treatment schedules and administrative procedures, institutional arrangements begin to sort patients into trajectories of relative advantage and disadvantage. Those equipped to meet the institution's implicit demands are better positioned to enter care, sustain treatment, and benefit from available interventions; those lacking the necessary resources face accumulating barriers, interrupted treatment, and potentially poorer outcomes. This sorting can occur without any explicit exclusionary rule or deliberate intent. It emerges through the interaction between routine institutional arrangements and unequal social circumstances, converting differences in patients' resources into patterned differences in access, continuity, and outcomes.

Structural sorting can occur in at least two connected ways.

Access-Side Sorting occurs when institutional arrangements make it more difficult for some people to enter or initiate care. Distance, costs, referral requirements, and administrative burdens may interact to impede access.

Within-System Sorting occurs after patients have entered care. Treatment schedules, attendance requirements, follow-up procedures, and assumptions about transport or caregiving may advantage patients who can sustain the demands of treatment. A patient who starts radiotherapy but cannot reliably travel to the facility may face interruptions or reduced benefit.

These processes should not be confused with a claim that every patient facing disadvantage requires more resources or that every difference in treatment outcome is structurally produced. Structural sorting is a hypothesis about the relationship between institutional arrangements and patterned disadvantage. It requires evidence about the mechanism through which the arrangement affects access or benefit.

2.3 From Disparity to Normative Assessment

A structural analysis must distinguish observation, explanation, and moral evaluation.

An *observed* disparity or adverse outcome warrants investigation. Differences in attendance, waiting time, treatment interruption, or benefit may indicate a problem without implicating its cause.

Furthermore, evidence must identify an institutional mechanism plausibly *explicating or contributing* to the disparity. For example, data may show that repeated travel requirements disproportionately interrupt treatment among patients living far from a facility.

Finally, further assessment must establish whether the mechanism systematically disadvantages a group, whether its effects are avoidable or otherwise *morally* unjustifiable, and which actors have obligations to respond. The assessment must consider the mechanism's context, foreseeable effects, available alternatives, and the authority of relevant actors.

This staged approach prevents SME from treating every unequal outcome as structural injustice. It also avoids the opposite error of interpreting a pattern as an aggregation of individual choices without examining the institutional arrangements shaping those choices. The distinction between diagnosis and evaluation is fundamental. EAST helps explain how sorting occurs; it does not, by itself, determine the obligations that follow. Those obligations require normative argument.

3. What Allocation Ethics Contributes—and What It Leaves Open

3.1 The Indispensability of Distributive and Procedural Justice

Distributive and procedural justice remain indispensable to healthcare priority setting. Distributive approaches provide principles for comparing competing claims, while procedural frameworks specify conditions under which decisions should be transparent, reasoned, and open to challenge. Daniels and Sabin's accountability for reasonableness (A4R), for example, identifies publicity, relevance, appeal and revision, and enforcement as conditions of legitimate priority setting. Substantive theories, including utilitarian, egalitarian, prioritarian, and sufficientarian approaches, offer different accounts of how benefits, burdens, and claims should be compared.

These approaches provide essential constraints on immediate allocation. Structural Moral Ecology (SME) does not displace them or assume that every disparity reveals an unjust decision. Its concern is complementary: even when an allocation is defensible under appropriate criteria and procedures, the institutional conditions shaping access to care may generate responsibilities that the decision itself does not resolve.

3.2 The Limits of Allocation-Focused Application

The distinction is between the justification of a decision and the justification of the conditions under which it becomes necessary. A fair procedure can determine how available treatment should be allocated without establishing whether recurring capacity failures, inaccessible services, or avoidable barriers have been adequately addressed. Conversely, evidence of structural disadvantage does not automatically establish that an affected patient should receive immediate priority over another claimant.

Four diagnostic concerns clarify what allocation-focused assessment may leave insufficiently examined:

- **Moral Overload**: Clinicians may be expected to address problems beyond their authority or practical capacity.
- **Institutional Invisibility**: Concentrating on individual decisions can obscure the arrangements that repeatedly constrain access or treatment.
- **Participation Traps**: Consultation may lend legitimacy to decisions without examining whether affected people can meaningfully influence the options available.

- **Capacity Presumption Failure**: Institutions may treat the existence of a decision procedure as sufficient even when they lack the practical capacity to deliver, monitor, or review care fairly.

These concerns identify possible weaknesses in institutional practice, not automatic findings of injustice. Their significance depends on the circumstances, supporting evidence, and applicable normative standards. SME uses them to direct inquiry towards the relationship between immediate allocation and continuing institutional responsibility.

3.3 Four Diagnostic Questions

A structurally informed assessment can be organised around four questions:

1. **Allocation**: Is the immediate decision defensible in light of the competing clinical claims, relevant allocation criteria, and available resources?

2. **Access**: Do institutional arrangements create foreseeable barriers to obtaining or continuing care?

3. **Responsibility**: Which actors have the authority, role, knowledge, or capacity to address those barriers?

4. **Response**: What actions are justified, and how should they be coordinated with immediate clinical priorities?

The questions connect allocation assessment to institutional inquiry without conflating their conclusions. A negative answer to the first question may require reconsideration of the decision itself; concerns raised by the remaining questions may require accommodation, review, escalation, or longer-term institutional action. In some cases, both forms of response will be necessary.

3.4 Evidence from Radiotherapy Prioritisation in Rwanda

Research on radiotherapy prioritisation in Rwanda provides a relevant context for examining how allocation decisions operate under constrained service capacity (DeBoer et al., 2024). Such evidence can illuminate the practical challenges of prioritisation and the institutional circumstances in which decisions are made. It does not, by itself, establish that existing allocation approaches are inadequate or that SME would produce superior outcomes.

Its relevance is narrower: priority setting occurs within service arrangements that shape which options are realistically available and whether patients can obtain timely, continuous care. An ethical assessment should therefore examine both the defensibility of the allocation and any additional responsibilities supported by evidence about the conditions of care. SME provides a framework for conducting that second inquiry while retaining distributive and procedural justice as essential constraints on the first.

4. Structural Moral Ecology: Normative Foundations

4.1 From Structural Diagnosis to Normative Obligation

Ecological Adverse Selection Theory (EAST) explains how institutional arrangements can systematically disadvantage people whose circumstances or capacities do not fit prevailing service assumptions. Yet identifying structural sorting does not, by itself, establish injustice or determine who must act. A normative account must connect the diagnosis of patterned disadvantage to justified obligations.

Structural Moral Ecology (SME) makes this connection through four propositions. First, institutional arrangements shape the opportunities through which people access, continue, and benefit from care. Second, clinicians and other decision-makers exercise their responsibilities within institutional conditions they may have limited power to change. Third, recurring disadvantage warrants investigation into its mechanisms and causes, although disparity alone does not establish injustice. Fourth, healthcare is relational: decisions affect patients, caregivers, professionals, and others involved in the provision and continuity of care.

Together, these propositions direct ethical inquiry beyond the immediate allocation decision without diminishing the importance of distributive and procedural justice. The normative question is whether the responsibilities of relevant actors have been adequately discharged both in making the decision and in addressing the conditions that shape the claims requiring adjudication.

4.2 Three Distinct Normative Judgements

SME distinguishes three judgements necessary to translate structural diagnosis into ethical action.

Duty attribution identifies which actors bear responsibilities and why. Relevant considerations include institutional role, decision-making authority, knowledge of the problem, contribution to its production or persistence, and capacity to remedy it. These considerations provide grounds for differentiated responsibility; they are not cumulative conditions that every duty-holder must satisfy.

Duty specification determines what the identified responsibilities require in practice. Depending on the circumstances, obligations may include fair scheduling, accessible communication, review of recurring barriers, reasonable accommodation, escalation of capacity constraints, or longer-term service improvement. The required response depends on the evidence, the nature of the disadvantage, and the actor's mandate and practical capacity.

Duty prioritisation determines how responsibilities should be ordered and coordinated when they compete for limited resources or cannot all be fulfilled immediately. It considers which actions are urgent, which can proceed concurrently, and which must follow a sequence. Prioritisation therefore applies to institutional responses as well as to claims for immediate treatment, while keeping their different purposes distinct.

These judgements are related but non-interchangeable. Identifying a responsible institution does not specify what it must do; specifying appropriate actions does not establish which should take

precedence. SME treats the three judgements as connected stages of normative assessment, not as a mechanical procedure that yields a predetermined answer.

4.3 African Relational Ethics and Continuing Care

African relational moral theories offer resources for understanding obligations that extend beyond isolated decisions. Metz's account of African moral thought, for example, foregrounds relationships and forms of identification and solidarity through which people's welfare and agency are interconnected (Metz, 2021). Applied to healthcare priority setting, this perspective draws attention to the responsibilities that persist towards patients whose claims cannot be met immediately, as well as to the effects of care arrangements on families and caregivers.

Relational responsibility does not mean that patients should receive priority because they occupy particular family roles, contribute more to a community, or appear more socially valuable. Such criteria risk converting social relationships into hierarchies of human worth. Relational ethics instead informs how obligations are understood and discharged: through communication, continuity, non-abandonment, and attention to the burdens imposed by institutional decisions. Its contribution to SME lies in broadening the field of responsibility while remaining subject to equal moral consideration and defensible allocation criteria.

4.4 Ecostructural Approaches and Place

Ecostructural approaches to health ethics direct attention to the environments in which health, illness, and care take shape. Eckenwiler's work on place and health justice, for example, helps illuminate how geographical and social arrangements condition people's opportunities to obtain care (Eckenwiler, 2022). Distance from treatment, transport availability, accommodation costs, and the distribution of services may influence whether formal access becomes effective access.

Place should therefore be treated as an object of ethical inquiry, not as an automatic criterion for allocating scarce treatment. Geographic disadvantage may justify investigation, accommodation, or institutional action, but its implications for immediate priority depend on the relevant clinical and normative circumstances. SME uses this ecological perspective to examine how the organisation of healthcare distributes opportunities and burdens across settings and over time.

4.5 The Distinctive Contribution of the Integration

SME integrates EAST's explanation of structural sorting with normative approaches that assess allocation, relationships, and place. EAST helps identify how disadvantage is produced or reproduced; distributive and procedural justice constrain immediate decisions; relational and ecostructural perspectives clarify the wider relationships and conditions affected by those decisions. SME connects these insights by asking which obligations arise, who bears them, what they require, and how they should be coordinated.

The integration does not establish that every structural disparity is unjust or that structural remedies should override urgent clinical claims. Its distinctive contribution is to make the justification of an allocation analytically distinct from the justification of the institutional conditions surrounding it. A decision may be defensible under scarcity while leaving reasonable and potentially remediable institutional responsibilities unfulfilled.

5. The Integrated Framework

SME translates its normative foundations into five connected elements: institutional capacity obligation, two-track justice, ecological legitimacy, differentiated responsibility, and relational non-discrimination. These elements guide assessment and institutional response; they do not constitute a numerical score or an algorithm for determining priority.

5.1 Institutional Capacity Obligation

Healthcare institutions have a continuing obligation to develop, maintain, and reasonably improve the conditions needed for fair access and defensible allocation. This institutional capacity obligation concerns the arrangements through which care is delivered, including staffing, equipment, scheduling, communication, referral, review, and service continuity.

The obligation is prospective as well as remedial. Institutions should respond to immediate failures while investigating recurring constraints that predictably impair access or treatment. Its demands remain bounded by institutional mandate, authority, available resources, feasibility, and competing responsibilities. Where a necessary remedy cannot be implemented immediately, the institution should be able to explain the constraint, identify feasible interim measures, and determine whether escalation or cooperation with other authorities is required.

This obligation should not be confused with an unlimited duty to eliminate every disadvantage. Nor does it imply that every service limitation makes an allocation unjust. Its purpose is to make reasonable institutional action on the conditions of care part of continuing ethical accountability. Constitutional jurisprudence may offer relevant comparisons: Soobramoney v Minister of Health (KwaZulu-Natal) [1997] ZACC 17; 1998 (1) SA 765 (CC), for instance, illustrates the significance of resource constraints in assessing access to treatment. The case does not itself establish SME's institutional capacity obligation, which is a normative claim developed here.

5.2 Two-Track Justice

SME distinguishes two connected tracks of justice. The **allocation track** evaluates who should receive a scarce resource now, using defensible clinical criteria and fair procedures. The **structural-response track** addresses institutional conditions that shape access, constrain available choices, or reproduce disadvantage.

The tracks are mutually relevant but cannot substitute for one another. Structural disadvantage does not automatically establish a stronger immediate claim, and a defensible allocation does not discharge all obligations arising from the conditions under which it was made. Some structural responses—such as communicating a decision, arranging review, or monitoring a patient's condition—may proceed alongside allocation. Others, including equipment repair or service expansion, may require separate resources and longer timeframes.

The framework therefore permits urgent clinical claims to take precedence while preserving responsibilities for structural investigation and response. It also guards against treating future institutional improvement as a sufficient answer to present unmet needs.

5.3 Ecological Legitimacy

Ecological legitimacy concerns whether both the immediate decision and the institutional response are ethically defensible in their relevant contexts. It has two related dimensions.

Decision-level legitimacy asks whether the allocation rests on relevant clinical considerations, fair and transparent procedures, adequate reasoning, and appropriate opportunities for review. **Institutional-level legitimacy** asks whether the arrangements shaping access are responsive to evidence of patterned disadvantage and whether relevant actors investigate and address barriers within their authority.

Three questions guide this assessment:

1. **Justification**: Are the allocation decision and its governing criteria defensible in light of the competing claims and available resources?

2. **Responsiveness**: Have relevant barriers to access or continuity been identified and assessed, rather than treated as incidental features of individual circumstances?

3. **Accountability**: Have appropriate responsibilities for action, communication, review, and longer-term response been assigned and made open to scrutiny?

These questions structure ethical inquiry rather than provide a validated measurement instrument. A finding of disadvantage initiates further assessment; it does not, without additional argument and evidence, establish either a violation of justice or a predetermined remedy.

5.4 Differentiated Responsibility

Structural responses require responsibilities to be assigned to actors positioned to discharge them. Clinicians may be responsible for defensible decisions, clear communication, monitoring, and escalation. Facilities may be responsible for scheduling, review processes, coordination, and identifying recurring service barriers. Health-system authorities may hold responsibilities for procurement, staffing, infrastructure, and service planning within their mandates.

Responsibility should reflect relevant authority, role, knowledge, contribution, and capacity to act. These considerations help determine who can reasonably be expected to undertake a particular response; they do not imply that responsibility belongs exclusively to the actor who directly caused a problem. Several actors may bear distinct or overlapping duties.

Assignments should be sufficiently specific to support accountability: the required action, responsible actor, relevant timeframe, and means of review should be identifiable. Where an actor lacks the authority or resources to discharge a duty alone, the appropriate response may include escalation, coordination, or a reasoned explanation of the constraint. SME thus avoids both attributing systemic failures solely to frontline professionals and allowing diffuse institutional responsibility to become responsibility without an identifiable bearer.

5.5 Relational Non-Discrimination

A structurally informed account of justice must recognise how illness and treatment arrangements affect relationships without turning social circumstances into measures of personal worth. SME distinguishes three considerations. **Relational needs** concern support necessary for a patient to access or continue care. **Relational consequences** concern effects of a decision on caregivers, dependants, and other affected people. **Social worth** assigns priority according to perceived contribution, status, family role, or value to others.

The first two may be relevant to accommodation, care planning, and the assessment of consequences. The third should not serve as a proxy for the moral worth of a patient or determine priority merely because one person is regarded as more socially useful. Relational attention must therefore operate within the constraints of equal consideration and defensible allocation.

This distinction allows SME to take seriously the interpersonal realities of healthcare without converting family responsibilities or social position into a hierarchy of claims. Relational non-discrimination is consequently a constraint on the application of structural and relational insight, ensuring that responsiveness to context does not legitimise exclusion or unequal moral standing.

6. Applying SME: A Constructed Radiotherapy Case

6.1 The Scenario

Consider a constructed scenario in a developing country A. A sole radiation oncologist serves a facility with two linear accelerators, one of which has been out of service for six months. More than 400 patients are waiting for radiotherapy, and the average waiting time is approximately four months. Supply chains are unreliable, and the facility lacks a formal, established process for appealing individual priority decisions.

The functioning accelerator has one compatible recurring daily appointment time available for a new curative course. This is not a single appointment: the same daily time must be available to the patient

throughout a course of approximately four to six weeks. The facility cannot begin a second curative course in parallel using that same appointment time. Once the first course is completed, the recurring slot can be reassigned. Repair of the second accelerator could create additional capacity, but the estimated repair time of four to eight weeks is uncertain.

Three patients require consideration.

Patient A is an eight-year-old child with cancer for which radiotherapy offers a reasonable prospect of cure. Without timely treatment, the child is expected to die within weeks. The clinical assessment indicates that a delay beyond approximately two weeks would materially reduce the probability of cure.

Patient B is a 45-year-old woman with locally advanced cervical cancer for which radiotherapy offers a reasonable prospect of cure. She has travelled approximately 200 kilometres for care. On the stipulated clinical assessment, a further delay of up to six weeks from the present assessment would remain clinically acceptable, although a longer delay would reduce the probability of cure. **This six-week estimate is specific to B's clinical circumstances and is not a general allowance that can simply be added to the facility's average waiting time. The average waiting time establishes the background context of constrained access; it does not establish B's individual waiting history.**

Patient C is a 67-year-old man with metastatic prostate cancer and severe bone pain. Palliative radiotherapy could relieve his symptoms through a short course or a single fraction, depending on clinical suitability. His pain is currently manageable with medication, but future access to palliative care is uncertain. For purposes of this scenario, an appropriate palliative pathway is available that does not displace either curative course. **This stipulation allows the case to examine continuing obligations without assuming that palliative care is inherently separate from curative allocation in all settings.**

The immediate decision is whether A or B should receive the recurring curative slot. If A begins immediately, B can provisionally be scheduled to begin when A's course is completed, approximately four to six weeks later, provided the schedule remains on track. The proposed start is therefore close to the upper boundary of B's stipulated clinically acceptable delay. The plan must be reviewed if A's course is extended, the slot is released late, B's clinical condition changes, or another treatment opportunity becomes available. The facility cannot assume that the second accelerator will be repaired on schedule.

On these stipulated facts, A has the stronger immediate claim because the treatment window is substantially narrower. The conclusion does not rest on A's age or an assumption that children possess greater social worth. It rests on the comparative clinical consequences of delay. Yet this allocation does not settle the ethical status of the institution's response to B or C. The case is designed to demonstrate that distinction.

6.2 Structural Diagnosis

The immediate shortage concerns the distribution of a treatment opportunity. The prolonged equipment outage, unreliable supply chains, extensive waiting list, and absence of established priority-setting and

review procedures concern the institutional conditions under which allocation takes place.

These conditions may interact. Equipment failure reduces available capacity; weaknesses in maintenance or procurement may prolong the loss; and the absence of transparent scheduling and review procedures can leave patients exposed to delays without a clear way to understand or contest them. The waiting list and the average wait are reasons to investigate the mechanisms sustaining constrained access. These factors alone are insufficient to establish that a particular patient has been wrongfully disadvantaged.

The case therefore presents two connected questions. First, is the immediate decision justified by relevant clinical considerations and fair procedures? Second, are the facility and other responsible actors taking reasonable steps to address the conditions that repeatedly make such decisions necessary? A defensible allocation may coexist with institutional failure. Conversely, structural disadvantage alone does not determine who should receive the next treatment slot. The case demonstrates why both questions require ethical scrutiny while retaining their distinct normative significance.

6.3 Duty Attribution

The radiation oncologist must make and document a clinically defensible decision and identify significant clinical changes, without assuming sole responsibility for capacity constraints beyond her control. The facility must ensure fair, reviewable scheduling, communicate anticipated start dates, reassess risks to timely treatment, and preserve access to palliative care. Authorities responsible for maintenance, procurement, staffing, and service planning bear corresponding duties where their mandates and powers permit action. Responsibility may arise from institutional authority or obligation, independently of causal contribution. Duties should therefore be assigned where action is possible. Clinicians must escalate problems beyond their authority, while institutions must ensure these problems receive appropriate attention and ownership.

6.4 Duty Specification

At the immediate clinical level, the decision-maker should document the comparative consequences of delay and the clinical grounds for selecting A. The rationale should make clear that the decision rests on the narrower treatment window, not on age as an independent measure of worth.

At the facility level, B should receive a provisional start date tied to the expected completion of A's course. The facility should communicate the basis and uncertainty of that schedule and establish a review point before B reaches the stipulated six-week boundary. The plan should be reassessed earlier if A's course is likely to extend, B's condition deteriorates, or a new treatment opportunity becomes available. A provisional reservation is not a guarantee of treatment, but it is a concrete means of protecting B's opportunity while the allocation remains clinically defensible.

The facility should also arrange appropriate palliative assessment and treatment for C through the stipulated pathway, while monitoring whether that pathway is genuinely accessible. The existence of a

nominal alternative is not sufficient if it cannot be used in practice.

At the institutional level, the prolonged equipment outage and its effect on the waiting list should be documented and escalated to actors with authority to respond. A meaningful response would identify responsibility, feasible actions, expected timeframes, and a process for reviewing progress. The framework permits uncertainty around repair dates where that uncertainty is genuine. It nevertheless requires an accountable response to the outage, beyond treating it as background misfortune.

6.5 Duty Prioritisation

Duty prioritisation must distinguish patient priority for treatment from the priority of institutional action. These questions interact, although they may involve different resources. A's narrower treatment window supports immediate use of the curative slot, given the stipulated clinical consequences of delay. This priority leaves B's claim and waiting time ethically significant. Scheduling, communication, monitoring, and reassessment of B's treatment opportunity can proceed alongside A's treatment, subject to feasibility. Equipment repair, procurement, and capacity expansion may compete with other institutional duties. Their prioritisation should consider the severity and recurrence of harm, intervention effectiveness, the number of patients affected, and the consequences of delay.

If A's course finishes as expected, B may begin within the stipulated window. If the projected start exceeds that window, the facility must reassess available alternatives and revise the plan in light of changed clinical circumstances or capacity. Any revision should follow transparent, relevant criteria. The decision remains conditional because its justification depends partly on facts that may change. A's initial priority can be defensible while the institution remains responsible for protecting B's treatment opportunity, addressing capacity failures, and maintaining attention to C's palliative needs.

In a nutshell duty attribution asks "Who is responsible?". Duty specification asks, "What must be done?' And Duty Prioritization asks "What must take precedence?" Ethical analysis must ask all three questions.

6.6 Moral Residue and the Limits of the Decision

Even a defensible allocation may leave unmet claims and justified regret. Opportunity cost identifies the treatment opportunity sacrificed by choosing one course of action; moral residue captures the ethical significance of that loss when another patient's claim remains unmet. Moral distress may signal a mismatch between professional responsibilities and the conditions of clinical practice. These responses warrant structural investigation when they reveal recurring, potentially remediable barriers, although they establish neither injustice nor a specific remedial duty by themselves.

The case illustrates SME's central distinction: comparative clinical urgency may justify the immediate allocation while the institutional conditions producing the sacrifice remain subject to ethical assessment. Justifying the decision leaves the justice of those conditions unresolved.

7. Governance Implications

Structural Moral Ecology (SME) connects ethical assessment of immediate allocation decisions with continuing responsibility for the institutional conditions shaping access to care. Governance should therefore address both the defensibility of individual decisions and the structural mechanisms that generate recurring disadvantage. Responsibilities should follow relevant authority, professional role, knowledge, and capacity to act. Clinicians remain accountable for defensible decisions, transparent reasoning, and appropriate escalation; facilities bear responsibilities for fair scheduling, communication, monitoring, and review; health-system authorities bear corresponding duties concerning capacity, procurement, staffing, and service planning within their mandates.

Evidence of patterned disadvantage should prompt investigation into its institutional causes and the feasibility of remedial action. Identified responsibilities should be translated into proportionate measures, assigned to relevant actors, and reviewed over time. Structural disadvantage alone establishes neither injustice nor a predetermined allocation priority. SME thus links allocation ethics to institutional accountability without conflating their distinct demands. Its governance contribution lies in making the responsibilities that persist beyond an immediate allocation decision visible to ethical assessment.

8. Conclusion

The ethical challenge of structural scarcity extends beyond deciding who receives care when resources are limited. It concerns the responsibilities generated by the institutional arrangements through which scarcity is experienced, managed, and reproduced. Structural Moral Ecology makes these responsibilities part of the assessment of justice, connecting defensible allocation with continuing institutional accountability.

Its central contribution is to distinguish the justification of an allocation from the justification of the conditions under which allocation occurs. The former determines whether a decision is defensible given the competing claims and available resources; the latter examines whether the institutions governing access have discharged their reasonable obligations to those affected. Neither judgement substitutes for the other.

This distinction shifts bioethical inquiry beyond the immediate distribution of scarce resources towards the institutional responsibilities that persist after a decision has been made. Justice under structural scarcity requires both defensible choices in the present and accountable action on the conditions shaping access to care over time.

Declarations

Ethics approval and consent to participate:

Not applicable. The study did not involve human or animal participants.

Consent for publication:

Not applicable.

AI Use Statement

ChatGPT was used during manuscript development for language editing and iterative structural organisation. The author reviewed and remains responsible for the manuscript's arguments, interpretation of sources, evidence, and conclusions

Funding:

No funding

Author Contribution

GRC conceived the idea and wrote and edited all versions of the paper.

Acknowledgements:

None

Availability of data and materials:

Not applicable. The study did not generate any data.

Competing interests: The author has no competing interests and no conflict of interests to declare

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