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Ph.D. Program in International and Comparative Education

**Health Professionals' Education in Ethiopia: A Comparative Study of Public
and Private Higher Education Institutions**

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Addis Ababa, Ethiopia

November, 2025

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**Health Professionals' Education in Ethiopia: A comparative study of
Public and Private Higher Education Institutions**

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A dissertation submitted to the Center for Comparative Education and Policy Studies in partial fulfillment of the requirements for the degree of Doctor of Philosophy in International and Comparative Education.

Declaration

I, the undersigned, hereby declare that the dissertation entitled “*Health Professionals’ Education in Ethiopia: A Comparative Study of Public and Private Higher Education Institutions*” is my original work, conducted independently, and has not been submitted in any form for the award of a degree or diploma at any other university or institution. All sources of information and materials used in the preparation of this dissertation have been properly cited and duly acknowledged in accordance with academic standards and ethical guidelines.

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This is to certify that the dissertation prepared by Yenuse Molla, entitled: Health Professionals' Education in Ethiopia: A Comparative Study of Public and Private Higher Education Institutions: has been examined and approved by the following examining committee in partial fulfillment of the requirements for the degree of Doctor of Philosophy (PhD).

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Abstract

Education is a cornerstone of national development, with higher education playing a critical role in advancing social, economic, and industrial progress. Within this sector, health professional education is essential for preparing skilled clinicians who can deliver quality healthcare and adapt to evolving medical landscapes. The quality of health science education directly impacts the competence of healthcare graduates, yet significant disparities exist between public and private higher education institutions (HEIs) in Ethiopia. Differences in resources, teaching methods, governance, and institutional support contribute to these variations.

Both public and private Ethiopian HEIs provide vital health professional training. Evaluating the educational environment in these institutions is crucial for strengthening the country's healthcare system. The educational climate encompasses the overall culture, physical setting, social interactions, teaching practices, policies, and leadership, all of which profoundly influence student engagement, motivation, and academic success. The Dundee Ready Education Environment Measure (DREEM) is a validated tool widely used to assess such environments in health professions education.

This study aimed to assess and compare the quality of the educational environments in Ethiopian public and private health professional programs and to explore their impact on student achievement. Guided by a pragmatic philosophy integrating quantitative and qualitative methods, a comparative cross-sectional case study design was conducted. A total of 492 students completed the DREEM inventory, resulting in an overall mean score of 138 out of 200. According to the DREEM interpretive guidelines, this score indicates a learning environment perceived as “more positive than negative,” suggesting a generally supportive and conducive academic atmosphere. Key strengths identified included effective teaching, respectful faculty-student relationships, and a positive academic self-perception among students. When comparing institutional types, students from public higher education institutions (HEIs) reported a higher average score of 141.6, while those from private HEIs reported a slightly lower average of 134.6 out of 200.

However, the score also suggests room for improvement, as it falls short of the 151-200 range designated as an “excellent educational environment.” Certain areas, potentially involving teaching quality, learning strategies, academic support, or social climate, may require targeted enhancements to optimize student experiences and outcomes. Improving these domains can elevate student satisfaction, academic performance, and psychological well-being, ultimately fostering more competent and confident health professionals.

Importantly, the study found a strong, statistically significant correlation between the educational environment and licensure examination performance. Students who perceived their environment more positively tended to achieve better exam results, underscoring the critical role of a supportive learning climate.

Thematic analysis highlighted multifaceted challenges affecting health science education in Ethiopia, spanning curriculum design, instructional quality, institutional governance, student support, resource allocation, and policy execution. These interconnected issues undermine educational and workforce outcomes. Nevertheless, participants proposed comprehensive, practical solutions that, if systematically implemented, could substantially enhance the quality and effectiveness of health science education in both public and private sectors.

This study emphasizes the importance of continuous evaluation and improvement of the educational environment as a strategic priority to strengthen health professional training and, consequently, the broader healthcare system in Ethiopia.

Key words:

- Health Professionals education,
- Educational Environment,
- DREEM tool,
- Student Achievement and
- Public-Private HEIs

Acknowledgment

First and foremost, I wish to express my deepest gratitude to my principal supervisor, Dr. Temesgen Fereja, for his exceptional guidance, insightful advice, and unwavering support throughout every phase of this research. His scholarly expertise, constructive feedback, and patience have profoundly influenced the conceptualization, execution, and refinement of this dissertation. I am equally indebted to my co-supervisor, Dr. Ayenachew Assefa, whose critical insights, meticulous review, and continuous encouragement have been invaluable in strengthening the academic rigor and overall quality of this work.

My heartfelt appreciation is extended to the faculty and staff of the Department of Curriculum and Comparative Education at Addis Ababa University, including Dr. Teshome Nekatibeb, Dr. Alebachew Kemmiso, Dr. Dessu Wirtu and Dr. Mekasha Kassaye, for cultivating an intellectually stimulating and collegial academic environment. Their mentorship, dedication, and scholarly example have greatly enriched my academic experience. I am also grateful to all professors including Dr. Effa Gurumu, who contributed their knowledge and time during my coursework and formative academic training, laying a strong foundation for this research endeavor.

I wish to extend special thanks to the data collectors and study participants whose cooperation, commitment, and generosity made this research possible. Without their participation and openness, the findings of this dissertation would not have been realized. I am also profoundly thankful to Jhpiego Ethiopia for its financial assistance and logistical support, which played a crucial role in facilitating the successful completion of this study.

My sincere gratitude also goes to my PhD cohort members, especially Samuel Asnake, as well as my colleagues and close friends, Ali Beyene and Eyuel Berihun, for their unwavering moral support, thought-provoking discussions, and continuous encouragement throughout this demanding journey. Their companionship and intellectual exchange have been an enduring source of motivation and strength.

Above all, I am deeply indebted to my beloved wife, Kedija Mekonnen, for her boundless love, patience, and sacrifices throughout the long hours devoted to research, writing, and study. Her unwavering encouragement and understanding have been the cornerstone of my perseverance and success. My sons, Ifraz and Nassem, have been a continual source of joy and inspiration, reminding me of the purpose and fulfillment that accompany hard work and dedication. I am equally grateful to my family and my wife's family for their unceasing prayers, moral support, and faith in my endeavors, which have sustained me throughout this academic pursuit.

Finally, I would like to acknowledge all individuals and institutions who have supported me directly or indirectly during this scholarly journey. Though not all are mentioned by name, please accept my sincere appreciation for your contributions, which have been instrumental to the realization of this work.

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List of Acronyms and abbreviations

- AAU – Addis Ababa University
- CBC – Competency Based Curriculum
- cGPA – Cumulative Grade Point Average
- CHS – College of Health Science
- DREEM - Dundee Ready Education Environment Measure
- FMOH – Federal Ministry of Health
- HEIs – Higher Education institutions
- HU – Hawassa University
- MoE – Ministry of Education
- MoH – Ministry of Health
- SPL - Students’ Perceptions of Learning
- SPT - Students’ Perceptions of Teachers
- SASP - Students’ Academic Self-Perceptions
- SPA - Students’ Perceptions of Atmosphere
- SSSP - Students’ Social Self-Perceptions

Chapter One: Introduction

The purpose of this chapter is to establish the context and foundation for the study. It provides a comprehensive overview of the educational environment within health professional education and its relationship to student achievement, with a particular focus on the Ethiopian context. The chapter begins by outlining the background of the study, offering insights into the current state of health professional education in Ethiopia, including historical developments, institutional structures, and existing challenges. It then presents the need to explore and compare the educational experiences and outcomes in both public and private higher education institutions.

Furthermore, the chapter articulates the statement of the problem, identifying specific gaps in knowledge and practice that the study aims to address. It discusses the significance of the study, highlighting its potential contributions to policy development, educational practice, and future research in the field of health sciences education. The research objectives and guiding research questions are clearly stated to direct the scope and focus of the investigation. By situating the study within the broader discourse on educational climate and student achievement, this chapter provides a solid foundation for understanding the complexities and nuances of health professional education in Ethiopia.

1.1. Background

Health professional education is one major area of higher education. Health professional education is a field of study in higher education that aims to empower clinicians to become effective educators, fostering skilled health workers to ensure universal healthcare, all within an evolving healthcare landscape (Hwang & Kuo, 2018). Health professional education includes various disciplines including medicine, nursing, midwifery, radiology and other allied health science disciplines. Health science education encompasses a wide array of settings, including universities, colleges, vocational schools, and healthcare institutions. These programs span from certificates and diplomas to undergraduate and graduate degrees. Furthermore, healthcare professionals have access to continuous education and professional development opportunities to bolster their expertise and competencies throughout their careers. Health science education plays a vital role in preparing competent healthcare professionals capable of addressing complex health challenges. Globally, the field has evolved significantly, transitioning from traditional didactic models to more student-centered, competency-based approaches that emphasize critical thinking, inter-professional collaboration, and lifelong learning. This evolution reflects a broader shift

toward aligning educational outcomes with the dynamic needs of modern healthcare systems(Frank et al., 2010).

High-quality education in health sciences is essential for developing competent healthcare professionals equipped with the knowledge, skills, and competencies necessary to excel in their roles. In Ethiopia, health science education has undergone significant transformation, driven by efforts to strengthen the healthcare system and address the growing needs of the population(Kahsay, 2012; Mekasha, 2020; Van Vught, 2008). While historically limited, the sector has expanded in recent years through the establishment of new schools and colleges, contributing to the mitigation of healthcare workforce shortages(Derbew et al., 2016; Leminie & Mekasha, 2025; Mekasha et al., 2022).

The quality of education for health professionals remains a cornerstone in cultivating a skilled, ethical, and capable healthcare workforce(De Oliveira et al., 2019; Nešić et al., 2021). As global demand for healthcare services continues to rise, the role of higher education institutions (HEIs) in preparing health professionals becomes increasingly vital. These institutions are tasked not only with delivering academic knowledge and technical proficiency but also with fostering an educational environment that encourages critical thinking, professionalism, and lifelong learning. However, disparities in educational quality and graduate outcomes between public and private HEIs persist, prompting critical examination of the underlying factors contributing to these differences(Bastos et al., 2024; De Oliveira et al., 2019).

Public and private higher education institutions (HEIs) differ significantly across several dimensions, including resource allocation, pedagogical approaches, institutional support systems, and governance structures(Ostojić & Leko Šimić, 2021). Public HEIs, predominantly funded by government sources, often benefit from more robust infrastructure, including well-equipped laboratories, libraries, and access to experienced faculty and research opportunities(Cayon et al., 2017). These resources can enhance the academic experience and support comprehensive professional training. In contrast, private HEIs typically rely on tuition fees and private investments, which may foster greater flexibility in adopting innovative teaching methodologies, integrating technology, and maintaining smaller class sizes that allow for more personalized instruction. However, these institutions may face financial limitations that affect their ability to invest in long-term infrastructure, faculty development, and research capacity. These structural and operational differences shape the broader educational environment encompassing physical facilities, social dynamics, and psychological support which plays a critical role in influencing students' academic performance, satisfaction, and readiness for professional practice(Ostojić & Leko Šimić, 2021). Understanding these distinctions is essential for policymakers and educators

aiming to ensure equitable and high-quality health science education across all types of institutions.

The Ethiopian government is actively engaged in expanding the higher education landscape, health science programs, to bolster the quantity and quality of the health workforce in the country(Kahsay, 2012). Collaborating with various stakeholders, the Ministry of Health has prioritized the overhaul of undergraduate health program curricula to enhance the quality of health professional education. Presently, health science education experts advocate for competency-based innovative curricula. Contemporary curricula place a strong emphasis on student-centered approaches, problem-solving, community-based education, integration, and early clinical exposure. In contrast, previous curricula mainly relied on lecture-based methods for gathering information, focused on hospital settings, emphasized apprenticeships, and were organized around separate courses rather than integrated learning experiences(FMOH, 2021). As a result, there has been a significant shift in curriculum design, transitioning from a teacher-centered approach to a student-centered approach to teaching and learning. This shift encourages the development of skills such as self-directed learning, hands-on experience, and the cultivation of lifelong learning abilities (Naik, 2012).

Public and private higher education institutions in Ethiopia both offer essential health professional training. Assessing the quality of education in these institutions is vital for enhancing the country's healthcare system. The growth of private higher education institutions, particularly in health sciences, has been remarkable(Kebede Kassahun, 2012). They have significantly expanded educational access, addressing the rising demand for healthcare professionals in Ethiopia. These private institutions have emerged as alternatives to the limited capacity of public universities and colleges. They offer opportunities to students who may face challenges in securing admission to public institutions due to factors like competition and capacity limitations (Tamrat, 2014). Nonetheless, the expansion of private higher education institutions in Ethiopia presents its own set of challenges. It's imperative to enhance quality assurance and accreditation processes to guarantee that these institutions adhere to essential standards and produce proficient graduates capable of addressing the healthcare requirements of the community (Leminie & Mekasha, 2025).

The educational climate in higher education embodies the holistic environment and culture of an institution, significantly shaping teaching, learning, and student experiences. It encompasses diverse facets such as the physical setting, social interactions, teaching practices, institutional policies, cultural considerations, and leadership (Jamaiah, 2008). This dynamic concept necessitates comprehensive evaluation and enhancement efforts to foster an environment

conducive to student success and future readiness. The educational climate holds a profound influence on students, educators, and overall educational outcomes(Mohsena et al., 2016a). The educational environment plays a vital role in delivering quality education, a global priority(Mohsena et al., 2016b). Recently, there has been growing attention to the learning environment in undergraduate health professionals' education. It's a key determinant of curriculum success, impacting behavior, academic achievements, satisfaction, and aspirations (Bassaw et al., 2003). The evolving student demographics may shape how this environment is perceived. Moreover, assessing and adapting the educational climate helps identify strengths and weaknesses, compare institutions, and gauge the impact of curriculum changes, serving as a valuable baseline for evaluation(Makhdoom, 2009).

The educational environment is a critical determinant of student success, particularly in health professions education. It profoundly shapes students' academic, personal, and professional development by influencing their engagement, motivation, and overall performance (Greenway, 2017; Mohsena et al., 2016a).. A positive and supportive learning climate not only enhances academic achievement but also fosters critical thinking, adaptability, and a commitment to lifelong learning. It cultivates essential qualities such as responsible citizenship and effective communication, which are vital for success in healthcare and beyond. Conversely, a negative educational environment can lead to stress, disengagement, and diminished outcomes, underscoring the importance of cultivating a nurturing and empowering atmosphere for students to thrive.(Sunkad et al., 2015). Recognizing the importance of assessing this environment, the Dundee Ready Education Environment Measure (DREEM) has become a widely used and validated tool in medical and health sciences education(Roff, 2005). The DREEM inventory evaluates five key domains: perceptions of learning, which reflect students' views on the quality and relevance of the curriculum and teaching methods; perceptions of teachers, which assess faculty competence, teaching styles, and the level of support provided; academic self-perceptions, which gauge students' confidence in their academic abilities and readiness to succeed; perceptions of atmosphere, which consider the overall institutional climate, including facilities, resources, and interpersonal relationships; and social self-perceptions, which measure students' sense of belonging and social integration within the academic community. Together, these domains offer a comprehensive understanding of the educational environment, enabling institutions to identify strengths and address areas needing improvement to better support student development and professional readiness. Emerging trends in educational assessment emphasize the integration of student feedback, competency-based evaluations, and continuous quality improvement. However, challenges persist, including disparities in resource allocation, faculty

development, and the alignment of curricula with healthcare system needs. These issues are particularly pronounced in low- and middle-income countries like Ethiopia, where balancing rapid expansion with quality assurance remains a pressing concern(Kelly et al., 2019). By measuring these domains, the DREEM tool provides a comprehensive assessment of the educational environment, highlighting areas of strength and those needing improvement.

In health science programs, the educational climate not only influences students' academic outcomes but also significantly impacts their professional identity, inter-professional collaboration, well-being, and commitment to ethical practice factors that collectively contribute to improved patient care(Negash et al., 2022). In Ethiopia, the landscape of health science education has evolved to align with global standards while addressing local healthcare needs. Universities benchmark their curricula internationally and require graduates to pass both a national exit exam administered by the Ministry of Education and a licensure exam by the Ministry of Health. These measures ensure that graduates are equipped to deliver safe, competent, and modern medical services. The educational programs integrate academic rigor, clinical exposure, and quality assurance mechanisms to prepare students for the complex demands of contemporary healthcare.

Given the critical role of the educational environment, analyzing its influence on student achievement is essential for enhancing program quality and producing competent healthcare professionals. Such analysis enables institutions to identify strengths, address deficiencies, refine teaching methodologies, and foster a more engaging and supportive learning atmosphere. This study employs the Dundee Ready Education Environment Measure (DREEM) to assess and compare the educational climates of public and private higher education institutions (HEIs) offering health science programs in Ethiopia. The goal is to uncover disparities in educational quality and understand how these differences affect student achievement and readiness for professional practice.

By conducting a comparative analysis, this research provides valuable insights for policymakers, administrators, educators, and stakeholders into the unique strengths and challenges of public and private HEIs. For instance, public institutions may benefit from greater access to resources and experienced faculty, while private institutions might offer more personalized instruction and innovative teaching approaches. Understanding these distinctions can inform targeted interventions and educational reforms aimed at improving the quality and equity of health science education across both sectors.

Moreover, this study addresses a notable gap in the literature, as few investigations have directly compared the educational environments of public and private HEIs in the context of health professions education. By examining not only the learning climate but also its correlation with student achievement measured through academic performance indicators such as cumulative GPA and licensure exam results this research offers both theoretical and practical contributions. The findings are expected to support evidence-based decision-making and foster collaborations that enhance the training and competence of future healthcare professionals in Ethiopia.

In summary, this research is grounded in the recognition that the quality of health professionals' education is a multifaceted issue influenced by institutional type, resources, and the educational environment. By using the DREEM tool as a framework, the study aims to provide a nuanced understanding of how public and private HEIs differ in their educational environments and how these differences impact student achievement. The findings will contribute to the ongoing discourse on improving health professions education and ultimately support the development of a more competent and resilient healthcare.

1.2. Statement of the problem

Health professionals' education is widely recognized as a cornerstone of healthcare system performance, directly influencing service quality, patient safety, and population health outcomes. Globally, the fundamental mandate of health professions education is to produce competent, ethical, and socially accountable practitioners capable of addressing national disease burdens and advancing universal health coverage through high-quality care delivery(Frenk et al., 2010a; Organization, 2016). In Africa, this mandate is particularly critical given persistent human resources for health (HRH) shortages and the growing complexity of health system demands(Rosa et al., 2020; Union, 2016).

In Ethiopia, health professionals' education has undergone rapid expansion over the past two decades, driven by national HRH strategies and an urgent need to scale up the health workforce. This expansion has involved a substantial increase in both public and private higher education institutions (HEIs) offering health science programs(Tamrat & Teferra, 2020). While this growth has improved access to training opportunities, it has also raised serious concerns regarding educational quality and graduate competence. Evidence increasingly suggests that the pace of institutional expansion has outstripped the capacity of regulatory, academic, and clinical training systems to ensure consistent educational standards across institutions.

This quality challenge is most starkly reflected in national licensure examination outcomes, which serve as a key proxy indicator of pre-service education quality and graduate readiness for professional practice ((WHO), 2013). Reports from the Ethiopian Ministry of Health reveal alarmingly low licensure pass rates over the last ten examination rounds, with an overall average pass rate of only 44.8% ((FMOH), 2021; Alemneh et al., 2022). More concerning is the pronounced disparity between graduates of public and private HEIs: while public university graduates achieved an average pass rate of 56.7%, their counterparts from private institutions attained only 32.2%. Such sustained underperformance particularly within the private sector signals systemic weaknesses in educational processes and raises serious questions about the effectiveness, equity, and accountability of health professional education in the country.

The implications of this problem extend beyond academic outcomes. Poorly prepared graduates pose a direct risk to patient safety, undermine public trust in the healthcare system, and threaten the achievement of national health goals ((WHO), 2016; Frenk et al., 2010a). Moreover, persistent licensure failure contributes to inefficiencies within the health labor market, including graduate unemployment, underemployment, and the paradoxical coexistence of workforce shortages with an oversupply of inadequately prepared graduates. If left unaddressed, these trends risk eroding national healthcare quality despite substantial investments in health education expansion.

A critical limitation in addressing this crisis is the lack of robust, comparative empirical evidence examining how educational environments differ between public and private health professional institutions in Ethiopia and how these differences relate to student achievement and licensure outcomes. International literature consistently demonstrates that the educational environment including teaching quality, learning resources, assessment practices, institutional climate, and clinical exposure is a powerful determinant of student learning, professional identity formation, and academic performance (J. Genn, 2001a; Pimparyon, 2000; Roff et al., 1997a). Tools such as the Dundee Ready Education Environment Measure (DREEM) have been widely validated and used globally to capture students' perceptions of these dimensions and to inform targeted educational reforms (Miles et al., 2012; Roff et al., 1997a).

However, in the Ethiopian context, empirical studies linking educational climate factors to measurable student outcomes particularly through direct comparisons of public and private HEIs remain scarce. Existing research on Ethiopian higher education has largely focused on system-level expansion, governance, and policy issues, with limited attention to the distinctive pedagogical, clinical, and institutional dynamics of health science education programs (Tamrat, 2014).

Even fewer studies have systematically examined students' perspectives on their learning environments or explored how variations in curriculum design, teaching methodologies, faculty capacity, infrastructure, and clinical training opportunities translate into differential academic and licensure performance across sectors. Graduates from both public and private HEIs face challenges in meeting the standards required for professional practice. These challenges may include gaps in knowledge, inadequate clinical skills, and a lack of preparedness for the demands of the healthcare workforce. Addressing these challenges requires a deeper understanding of the factors influencing student achievement and the role of the educational environment in preparing graduates for professional practice.

This gap in knowledge constrains the ability of policymakers, regulators, institutional leaders, and educators to design evidence-based interventions that address the root causes of poor performance. Without a clear understanding of which aspects of the educational environment most strongly influence student achievement and how these factors differ between public and private institutions quality assurance efforts risk remaining fragmented, reactive, and ineffective.

Therefore, this study seeks to address a critical national and scholarly gap by systematically examining and comparing the educational environments of public and private health professional education institutions in Ethiopia and analyzing their relationship with students' academic performance and licensure examination outcomes. By employing the validated DREEM instrument alongside complementary qualitative inquiry, the study generates context-specific, actionable evidence on how educational climate factors shape learning experiences and outcomes. The findings are intended to inform targeted reforms aimed at bridging quality gaps, strengthening regulatory oversight, enhancing institutional accountability, and ultimately improving the competence of Ethiopia's health workforce. In doing so, the study provides valuable insights for policymakers, institutional leaders, educators, and accreditation bodies committed to safeguarding patient safety and advancing national health system performance.

1.3. Research questions

1. What is the status of the educational environment in public and private higher education institutions offering health professionals' education in Ethiopia?
2. What is the level of student achievement in public and private higher education institutions offering health professionals' education in Ethiopia?
3. To what extent does the educational environment predict and correlate with academic achievement among health science students in Ethiopia?
4. How do the educational environment and student achievement vary between undergraduate health science programs in Ethiopian public and private higher education institutions in Ethiopia?
5. What are the challenges affecting the performance of graduates in Ethiopian public and private higher education institutions?

1.4. Research Objectives

Major objective

The main objective of this study is to assess the quality of the educational environment for health professional programs in Ethiopian public and private higher education institutions and its impact on students' achievement.

Specific objective

- To evaluate the status of educational environment in public and private higher education institutions offering health professionals' education in Ethiopia
- To determine the level of student achievement in public and private higher education institutions offering health professionals' education in Ethiopia
- To examine the correlation between the educational environment and students' achievement in both public and private higher education institutions in Ethiopia.
- To test the statistical difference in educational environment and students' achievement between Ethiopian public and private higher education institutions.
- To explore the challenges affecting the performance of health professional graduates in Ethiopian public and private higher education institutions.

1.5. Significance of the study

This study holds substantial significance at theoretical, practical, and policy levels, as it addresses critical gaps affecting the quality of health professionals' education and, ultimately, healthcare delivery in Ethiopia. By systematically examining the educational environment and its relationship with students' academic achievement in both public and private higher education institutions (HEIs), the study contributes to strengthening the evidence base needed to improve health workforce preparation and health system performance.

Theoretical Significance

At the theoretical level, this study contributes to the existing body of knowledge in health professions education by empirically examining the relationship between educational climate and student achievement within the Ethiopian context. While international literature has consistently demonstrated that the educational environment is a key determinant of learning outcomes, professional development, and academic performance, such evidence remains limited and fragmented in low- and middle-income countries, particularly in sub-Saharan Africa.

This study advances theory by:

- Extending the application of the Dundee Ready Education Environment Measure (DREEM) to a comparative public–private institutional context in Ethiopia.
- Empirically testing the predictive and correlational relationships between specific dimensions of the educational environment and students' academic achievement.
- Generating context-sensitive insights that enrich global health professions education theories, which are often derived from high-income settings.

By addressing these gaps, the study strengthens the conceptual understanding of how educational environments influence student outcomes in resource-constrained and rapidly expanding higher education systems.

Practical Significance

From a practical perspective, the findings of this study offer actionable insights for educators, institutional leaders, and health science faculty seeking to improve student performance and graduate competence. By identifying strengths, weaknesses, and critical determinants of effective educational environments in both public and private HEIs, the study provides evidence that can be directly translated into educational practice.

Specifically, the results can inform:

- Curriculum design and revision to better align learning experiences with desired competency outcomes.
- Teaching and assessment strategies that enhance student engagement, motivation, and academic success.
- Faculty development programs aimed at improving instructional quality and mentorship.
- Institutional support mechanisms, including learning resources, clinical training opportunities, and student support services.

Through the identification of successful practices across sectors, the study enables institutions to adopt and adapt proven strategies that enhance educational quality and improve licensure and academic performance.

Policy Significance

At the policy level, this study provides critical empirical evidence to support informed decision-making by national stakeholders, including the Ministry of Health, Ministry of Education, regulatory bodies, accreditation agencies, and higher education policymakers. Given the persistently low licensure examination pass rates and the pronounced performance disparities between public and private HEIs, evidence-based policy interventions are urgently needed.

The study's findings can influence:

- National quality assurance and accreditation standards for health professional education programs.
- Regulatory and licensing policies aimed at ensuring minimum educational standards across institutions.
- Resource allocation decisions, including investments in faculty capacity, infrastructure, and clinical training platforms.
- National health workforce strategies by linking educational quality to workforce competence and patient safety.

By grounding policy discussions in robust empirical data, this research supports systemic reforms that can bridge quality gaps between institutions, enhance accountability, and safeguard the competence of the future health workforce.

Overall Contribution

Collectively, the theoretical, practical, and policy contributions of this study position it as a critical resource for advancing health professionals' education in Ethiopia. By aligning educational practices and policies with empirical evidence, the study contributes to the development of a competent, adaptable, and high-quality healthcare workforce. Ultimately, these improvements in the educational landscape have the potential to enhance healthcare service delivery, protect patient safety, and support sustainable national development.

1.6. Operationalization Through the DREEM Tool

The DREEM tool serves as a bridge between these theoretical frameworks and the practical assessment of the educational environment. It provides a structured and validated approach to measuring the key dimensions of the educational environment, as outlined below:

- **Perceptions of Learning:** Reflects the extent to which students perceive their learning experiences as meaningful, relevant, and engaging (aligned with constructivist principles).
- **Perceptions of Teachers:** Assesses students' views on the competence, teaching styles, and support provided by faculty (linked to the role of teaching methods in systems theory).
- **Academic Self-Perceptions:** Measures students' confidence in their academic abilities and their sense of preparedness for professional practice (related to the learner-centered focus of constructivism).
- **Perceptions of Atmosphere:** Evaluates the overall climate of the institution, including facilities, resources, and interpersonal relationships (connected to the systemic elements of resources and institutional support).
- **Social Self-Perceptions:** Captures students' sense of belonging and social integration within the institution (aligned with the collaborative and interactive aspects of constructivism).

Students' perceptions of the educational environment reflect how they experience the overall atmosphere, teaching quality, academic support, and social climate within an institution. To assess these perceptions in a standardized and comprehensive manner, this study employs the Dundee Ready Education Environment Measure (DREEM), a widely validated instrument developed specifically for use in health professions education (Roff et al., 1997a).

The DREEM questionnaire consists of 50 closed-ended items, each rated on a five-point Likert scale: *Strongly Agree (4), Agree (3), Uncertain (2), Disagree (1), and Strongly Disagree (0)*. Nine of these items (4, 8, 9, 17, 25, 35, 39, 48, and 50) are negatively worded and thus reverse scored to maintain consistency in interpretation. The total possible score is 200, representing an ideal educational environment.

The 50 items are grouped into five subscales, each targeting a specific dimension of the learning environment:

1. Students' Perceptions of Learning (SPL) – 12 items, maximum score: 48
2. Students' Perceptions of Teachers (SPT) – 11 items, maximum score: 44
3. Students' Academic Self-Perceptions (SASP) – 8 items, maximum score: 32
4. Students' Perceptions of Atmosphere (SPA) – 12 items, maximum score: 48
5. Students' Social Self-Perceptions (SSSP) – 7 items, maximum score: 28

Higher scores on each subscale and the total scale indicate a more favorable perception of the educational environment. The total DREEM score is interpreted as follows:

- 0–50: Very Poor
- 51–100: Plenty of Problems
- 101–150: More Positive than Negative
- 151–200: Excellent

For individual items, scores are interpreted to guide institutional improvement:

- ≥ 3.5 : Areas of excellence
- 2.1–3.4: Areas that could be enhanced
- ≤ 2.0 : Problematic areas requiring attention

In this study, mean scores will be computed for each item and subscale, and these will be used to evaluate the overall educational environment. Additionally, DREEM scores will be correlated with students' academic achievement and learning approaches.

Academic achievement will be measured using three indicators:

1. Licensure examination scores, obtained from the Ministry of Health through an official departmental request letter
2. Cumulative Grade Point Average (CGPA), as reported by the institutions

3. Self-reported academic performance, captured on a five-point Likert scale

The study seeks to explore the relationship between students' perceptions of their educational environment and their academic performance and professional preparedness. To achieve this, the validated English version of the DREEM tool will be administered to final-year students across medicine, nursing, midwifery, and radiologic technology programs. Utilizing the DREEM tool allows the study to translate theoretical frameworks into measurable terms, facilitating a thorough evaluation of the educational environment and its influence on student outcomes. This method ensures the research is both conceptually sound and practically applicable, offering valuable insights for enhancing the quality of health professional education.

1.7. Delimitation and limitations of the study

This section outlines the boundaries set by the researcher (delimitations) and the potential weaknesses or uncontrollable factors (limitations) inherent in the research design.

1.7.1. Delimitations:

1. Geographic scope: The study focuses specifically on Ethiopian public and private higher education institutions. It does not include institutions from other countries or regions.
2. Target population and programs: The study concentrates on health professionals pursuing education at the higher education level, such as undergraduate medicine, nursing, midwifery and radiology technology program. It may not encompass other levels of education, such as postgraduate education, secondary or vocational training. And also, it may not include other than the abovementioned programs
3. Assessment of the educational environment: The research primarily focuses on the assessment of the educational environment's quality for health professionals. It may not extensively cover other factors that can influence students' achievement, such as individual characteristics or socio-economic factors.
4. Impact on students' achievement: The study examines the impact of the educational environment's quality on students' achievement. However, it may not delve into other potential outcomes or variables, such as students' satisfaction, motivation, or career development.
5. Timeframe: The investigation assumes a specific timeframe for data collection and analysis. It may not account for changes or developments in the educational environment beyond that period.

1.7.2. Limitations:

1. Sample size and representativeness: The study's findings may be limited by the size and representativeness of the sample used for data collection. It is essential to acknowledge that the results may not be generalizable to the entire population of health professionals in Ethiopian higher education institutions.
2. External factors: Various external factors beyond the educational environment, such as personal circumstances or external support systems, can influence students' achievement. The study may not be able to fully control or account for these factors, which could affect the interpretation of the results.
3. Resource constraints: The study may face limitations in terms of time, funding, or access to resources. These constraints can affect the comprehensiveness and depth of the research, potentially limiting the extent of analysis and interpretation of the findings.

It is important to consider these delimitations and limitations when interpreting the findings of this study to understand the context and boundaries within which the research will be conducted.

1.8. Organization of the Study

This dissertation is structured into five comprehensive chapters, each systematically addressing the major components of the research.

Chapter One introduces the study by establishing the overall context and background of health professionals' education in Ethiopia, emphasizing both national and global perspectives. It outlines the statement of the problem that necessitated the study, presents the rationale and justification for conducting the research, and specifies the general and specific objectives. The chapter also formulates the research questions that guide the investigation, highlights the significance and potential contributions of the study, and clarifies its scope and delimitations. It concludes with an overview of how the dissertation is organized.

Chapter Two offers a detailed review of related literature, synthesizing existing scholarly works and empirical studies relevant to the research topic. It explores both global and national discourses on educational climate, emphasizing the importance of a conducive learning environment in health professional education. The chapter critically examines the distinctions between public and private higher education institutions, highlighting variations in resources, governance, faculty competencies, and student support mechanisms. Furthermore, the chapter presents the conceptual framework and theoretical foundations that underpin the study, providing a clear structure for understanding the variables and their relationships. Additionally, it reviews

literature on the relationship between the educational environment and student achievement, drawing on previous studies that employed the DREEM tool and related models to assess educational quality and its influence on academic outcomes.

Chapter Three describes the research methodology employed to address the study's objectives and research questions. It elaborates on the study design, the characteristics of the study population, and the sampling techniques used to select participants. This chapter also provides detailed descriptions of the data collection instruments, including the DREEM questionnaire and the procedures for obtaining licensure examination data. The chapter outlines the data collection processes, the validity and reliability checks conducted on the instruments, and the methods applied for both quantitative and qualitative data analyses. It also discusses the ethical considerations observed throughout the research process to ensure compliance with academic and professional standards.

Chapter Four presents the findings of the study in a systematic manner. It begins with descriptive analyses of the participants' characteristics and proceeds to present the quantitative results, including mean scores of educational climates across public and private institutions, comparative analyses, correlation findings, and regression models that examine the predictive relationships between educational climate and student achievement. Qualitative findings are also integrated to provide a richer, more comprehensive understanding of the educational environment and its impact.

Chapter Five provides a thorough discussion of the major findings in relation to existing literature, highlighting areas of convergence and divergence with previous studies. It offers interpretations of the results, considering the broader implications for educational policy, institutional practice, and quality assurance in health professionals' education.

Chapter six concludes by drawing key findings and conclusions, formulating evidence-based recommendations for stakeholders, and suggesting directions for future research that can further advance knowledge in this important field.

Finally, the dissertation concludes with a comprehensive list of references and appendices. The appendices include the research instruments used in the study, ethical clearance documentation, consent forms obtained from participants, and any supplementary data that support the study's findings and analyses.

Chapter Two: Literature review

2.1. Introduction

The education of health professionals is critical to the quality of healthcare delivery. The learning environment plays a significant role in shaping the educational experiences and outcomes of students. The Dundee Ready Education Environment Measure (DREEM) is a widely used tool to assess the educational environment in health professions education. Health professionals' education in Ethiopia plays a crucial role in preparing competent healthcare providers to address the country's healthcare challenges. This literature review aims to provide a comprehensive analysis of health professionals' education in Ethiopia, specifically focusing on a comparative study of public and private higher education institutions. The review examines the performance of graduates on licensure examinations and the assessment of the educational environment in both public and private HEIs sectors. The performance of undergraduate health science students on licensure examinations is an important indicator of the quality of health professionals' education. In Ethiopia, the performance of health science students on licensure examinations has been consistently low, raising concerns about the quality of health professionals' education in the country. This study aims to investigate the contributing factors and impact of the educational environment on the performance of health science students on licensure examinations, with a comparative analysis of public and private higher education institutions.

This review synthesizes literature on the educational environment (assessed using the Dundee Ready Education Environment Measure, DREEM) and student achievement (measured by licensure exam performance) in Ethiopian health science programs, comparing public and private institutions. In addition, the chapter introduces the conceptual and theoretical frameworks that underpin the study, offering perspectives that inform the analysis and interpretation of data.

A systematic search was conducted in PubMed, Google Scholar, Scopus, and Ethiopian institutional repositories. Inclusion criteria: peer-reviewed articles, theses, and reports (2010–2024) addressing educational environment, student achievement, or institutional comparisons.

Search Strategy

A comprehensive systematic literature review was undertaken to identify and synthesize existing research on health professionals' education in Ethiopia, with a particular emphasis on the educational environment, as assessed by the Dundee Ready Education Environment Measure (DREEM) tool, and student achievement, evaluated through licensure examination performance. The review aimed to compare these dimensions across public and private higher education institutions (HEIs) to provide a nuanced understanding of the current educational landscape. A

wide range of international and national databases and institutional repositories were systematically searched to ensure exhaustive coverage of relevant literature. International databases included PubMed, for biomedical and medical education literature; Scopus, for multidisciplinary peer-reviewed articles; and Google Scholar, to capture broader academic sources, including grey literature. Ethiopian institutional repositories encompassed the Addis Ababa University Institutional Repository, Jimma University Digital Library, as well as official reports from the Ministry of Health (MoH) and Ministry of Education (MoE), alongside local scholarly sources such as the Ethiopian Medical Journal and other national journals.

The search strategy employed a combination of controlled vocabulary and free-text keywords, integrated using Boolean operators (AND, OR), to enhance sensitivity and specificity. The primary search terms were categorized under four main thematic areas: (1) health professionals' education ("health professionals' education," "medical education," "health science education"); (2) educational environment ("DREEM tool," "educational environment assessment," "student perception medical education"); (3) student achievement ("licensure exam performance," "medical licensing exam," "health professionals' competency assessment"); and (4) institutional comparison ("public vs private medical schools," "comparison of health education," "higher education quality"). The inclusion criteria encompassed peer-reviewed journal articles, theses, dissertations, government reports, and conference proceedings published between 2010 and 2024, written in English or Amharic (with translation as needed), and studies that directly assessed the educational environment (using the DREEM or equivalent tools), student academic outcomes (licensure examination results or other academic performance indicators), and comparative analyses between public and private HEIs. Studies were excluded if they were not specifically focused on health science education and higher education, were non-empirical in nature (e.g., editorials, opinion pieces), or lacked robust methodological rigor or clearly defined outcome measures.

The screening and selection process adhered to established systematic review protocols. Data extraction was systematically conducted, and the extracted data were categorized thematically into key domains: educational environment (measured via DREEM scores), licensure examination performance, comparative analyses between public and private institutions, and emergent challenges and policy recommendations identified across studies.

Table 1: Summary of search strategies

Component	Details
Databases and Sources	International Databases: • PubMed • Scopus • Google Scholar Ethiopian Institutional Repositories: • Addis Ababa University Repository • Jimma University Digital Library • Ministry of Health (MoH) Reports • Ministry of Education (MoE) Reports • Ethiopian Medical Journal and local journals
Keywords and Search Terms	Health Professionals' Education: • "health professionals' education" • "medical education" • "health science education" Educational Environment (DREEM): • "DREEM tool" • "educational environment assessment" • "student perception medical education" Student Achievement: • "licensure exam performance" • "medical licensing exam" • "health professionals' competency assessment" Public vs Private: • "public vs private medical schools" • "comparison of health education" • "higher education quality"
Boolean Operators Used	AND, OR (to combine search terms across categories)
Inclusion Criteria	• Peer-reviewed articles, theses, dissertations, government reports, conference proceedings • Published between 2010 and 2024 • Languages: English and Amharic (translated) • Studies on educational environment, student achievement, and public-private comparisons
Exclusion Criteria	• Studies not specific to health science and higher education • Editorials, opinion pieces, non-empirical works • Studies lacking clear methodology or outcomes
Data Extraction Themes	• Educational Environment (DREEM scores) • Licensure Exam Performance • Public vs Private Comparisons

Component	Details
	Challenges and Recommendations

6. Quality Assessment

- **Risk of Bias:** Assessed using Newcastle-Ottawa Scale (NOS) for observational studies.
- **Strength of Evidence:** Prioritized studies with large sample sizes, longitudinal designs, and validated tools (e.g., DREEM).

7. Limitations

- **Limited studies on private institutions** (most research focuses on public universities).
- **Variability in licensure exam reporting** (some institutions do not publish pass rates).
- **Self-reporting bias** in DREEM-based studies.

This systematic review employed a rigorous, multi-database search strategy with strict inclusion/exclusion criteria to ensure comprehensive and relevant evidence on health professionals' education in Ethiopia. The findings were synthesized to compare public vs. private institutions in terms of educational environment and student achievement, while identifying key challenges and recommendations.

2.2. Theoretical and Conceptual Framework

The conceptual framework for this study is designed to illustrate the relationships between independent variables, mediating variables, and dependent variables in the context of health professionals' education. The conceptual framework for this study is the relationship between the educational climate and students' achievement in public and private higher education institutions. It posits that the educational environment, when influenced by factors such as teaching quality, learning resources, student engagement, institutional policies, and peer relationships, can impact students' academic success and skills development.

The educational environment in public and private higher education institutions plays a crucial role in shaping the quality of health professionals' education and students' achievement. It considers the interplay of various factors that influence the educational environment, student performance, and overall quality of education (Shewatek Gedamu, 2024). It provides a structured way to understand how institutional factors influence the educational environment and, in turn, impact student achievement. Below is a detailed explanation of each component, followed by a visual representation of the framework

1. Independent Variables

These are the factors that are presumed to influence the educational environment and student achievement. They include:

- **Institutional Type (Public vs. Private):** Public and private HEIs differ in terms of funding, governance, and resource allocation, which may affect the quality of education.
- **Resources:** Availability of facilities, learning materials, and financial support for students and faculty.
- **Teaching Methods:** Pedagogical approaches used by faculty, such as lecture-based, problem-based, or experiential learning.
- **Institutional Support:** Policies, administrative structures, and support services (e.g., counseling, career guidance) that facilitate teaching and learning.

These variables are considered independent because they are external factors that can be manipulated or influenced to improve the educational environment and student outcomes.

2. Mediating Variables

The mediating variable in this framework is the Educational Environment, as measured by the DREEM (Dundee Ready Education Environment Measure) tool (Roff, 2005). The educational environment acts as a bridge between the independent variables and the dependent variables. It is composed of five domains:

1. **Perceptions of Learning:** Students' views on the quality and relevance of the curriculum and teaching methods.
2. **Perceptions of Teachers:** Students' perceptions of faculty competence, teaching styles, and support.
3. **Academic Self-Perceptions:** Students' confidence in their academic abilities and their ability to succeed.
4. **Perceptions of Atmosphere:** The overall climate of the institution, including facilities, resources, and interpersonal relationships.
5. **Social Self-Perceptions:** Students' sense of belonging and social integration within the institution.

The educational environment mediates the relationship between institutional factors (independent variables) and student achievement (dependent variables). For example, better resources and teaching methods may lead to a more positive educational environment, which in turn enhances student achievement.

3. Dependent Variables

These are the outcomes that the study seeks to measure and explain. They include:

- **Academic Performance:** Measured through indicators such as GPA, exam scores, and course completion rates.
- **Professional Competence:** Assessed through licensure exam results, clinical skills, and readiness for professional practice.

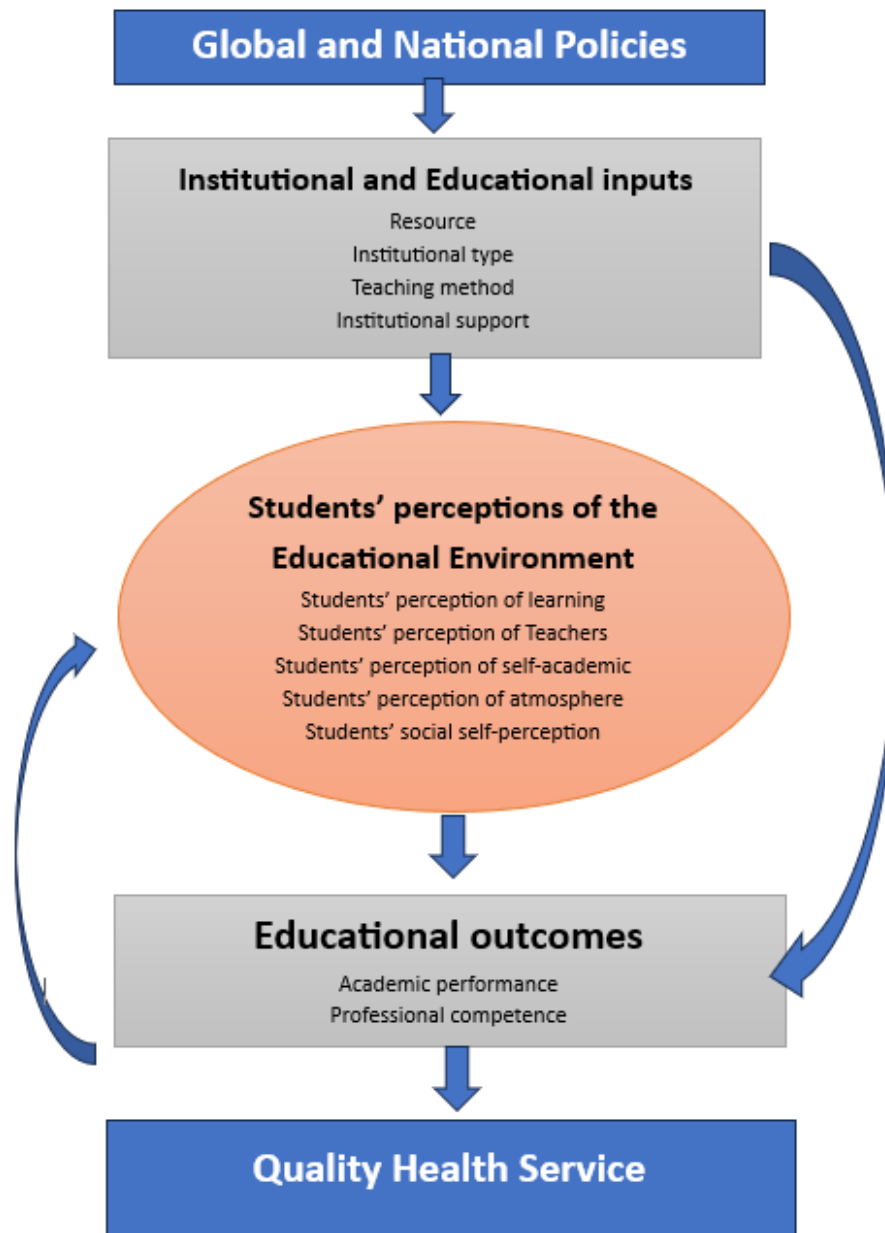


Figure 1: Conceptual framework

This conceptual framework provides a clear and structured way to analyze the relationships between institutional factors, the educational environment, and student achievement. It highlights the importance of the educational environment as a mediating factor and underscores the need for targeted interventions to improve institutional resources, teaching methods, and support systems. By doing so, the framework aims to enhance the quality of health professionals' education in both public and private HEIs.

2.3. Theoretical frameworks

This section sets out the theoretical framework of this study. To understand the educational environment and its impact on student achievement, the conceptual framework draws upon relevant theories and models. This study is grounded in three key theoretical frameworks: constructivist learning theory, systems theory and institutional theory. These frameworks provide a robust foundation for understanding the complex relationship between the educational environment, institutional factors, and student achievement in health professionals' education. Additionally, the DREEM (Dundee Ready Education Environment Measure) tool serves as a practical instrument to operationalize these theories by measuring specific dimensions of the educational environment.

2.3.1. Constructivist Learning Theory:

Constructivist learning theory asserts that learning is not a passive absorption of information but rather an active and dynamic process in which individuals build or "construct" new knowledge based on their prior experiences, cognitive structures, and social interactions(Anthony, 1996). According to this theory, learners do not simply receive knowledge from external sources; instead, they engage with new concepts by integrating them with what they already know, actively reshaping and refining their understanding through meaningful experiences. Learning is therefore seen as contextualized, occurring most effectively when it is embedded within authentic, real-world tasks and environments that allow learners to explore, question, and collaborate(Fernando & Marikar, 2017). The role of the teacher, from a constructivist perspective, shifts from that of a knowledge-transmitter to a facilitator or guide who supports learners in constructing their own understanding by providing appropriate scaffolding, posing challenging questions, and fostering reflective dialogue. (Palincsar, 1998). This theory emphasizes the following key principles:

- **Learner-Centered Education:** Students are not passive recipients of knowledge but active participants in the learning process. Their prior experiences, beliefs, and interactions shape how they interpret and internalize new information(Anthony, 1996).
- **Role of the Educational Environment:** The environment in which learning takes place plays a critical role in facilitating or hindering the construction of knowledge. Factors such as teaching methods, institutional support, and peer interactions influence students' learning experiences and outcomes.

- **Collaborative Learning:** Learning is enhanced through social interactions and collaboration, where students engage in dialogue, share perspectives, and solve problems collectively.

In the context of this study, constructivist learning theory underscores the importance of the educational environment in shaping students' perceptions, engagement, and academic performance. For example, a positive learning environment that encourages active participation, critical thinking, and collaboration is likely to foster better learning outcomes. Conversely, a negative or unsupportive environment may lead to disengagement and poor performance. By using the DREEM tool, the study operationalizes this theory by assessing students' perceptions of their learning environment across five domains: perceptions of learning, teachers, academic self-perceptions, atmosphere, and social self-perceptions.

2.3.2. Systems Theory

Systems theory is a conceptual framework that helps us understand the behavior and interactions of complex systems (Hilpert & Marchand, 2018). It provides a holistic approach to studying systems by analyzing their components, structures, processes, and the relationships between them. Systems theory originated in the fields of biology and engineering but has since been applied to various disciplines, including sociology, psychology, management, and ecology (Whitchurch & Constantine, 1993). At its core, systems theory views a system as a unified whole composed of interrelated and interdependent parts. These parts can be physical components, such as organs in a biological system or departments in an organization, or abstract elements, such as ideas or information flows. The behavior of the system is not solely determined by the individual parts, but also by the interactions and relationships between them (Whitchurch & Constantine, 1993).

Systems theory provides a framework for understanding the dynamics and complexity of systems, facilitating analysis, problem-solving, and decision-making in various fields. It emphasizes the interdependencies and relationships within systems, highlighting the importance of a holistic perspective when studying and managing complex phenomena (Luhmann et al., 2013). This theory views educational institutions as complex systems with interconnected components (Luhmann et al., 2013). It focuses on the interrelationships and interdependencies within a system. It can be applied to examine the different components of the educational environment, such as curriculum, faculty, resources, and support services, in both public and private institutions and how they affect the overall quality of health professionals' education. Systems theory has also been applied in the study of health professionals' education in both public and private higher education institutions.

This theory suggests that organizations are complex systems that are composed of interrelated parts, and that the behavior of the system as a whole is influenced by the interactions between these parts (Bertalanffy, 1968). In the context of health professionals' education, systems theory suggests that educational institutions are complex systems that are composed of various elements, such as faculty, students, curriculum, resources, and organizational culture. These elements are interrelated and interact with each other, and changes in one element can have ripple effects throughout the system.

Systems theory provides a holistic framework for understanding the interplay between various components of an educational institution and their collective impact on student achievement (Mallillin, 2023). According to this theory, an institution can be viewed as a system composed of interrelated and interdependent elements, such as:

- **Resources:** Availability of facilities, funding, and learning materials.
- **Teaching Methods:** Pedagogical approaches used by faculty to deliver content and engage students.
- **Institutional Support:** Policies, administrative structures, and support services that facilitate teaching and learning.
- **Stakeholders:** Students, faculty, administrators, and external partners who contribute to the educational process.

Systems theory highlights the importance of considering the interactions between these elements rather than examining them in isolation (Mallillin, 2023). For instance, the quality of teaching methods may depend on the availability of resources and institutional support, while student achievement may be influenced by the combined effects of teaching quality, resource availability, and the overall institutional climate.

In this study, systems theory is applied to analyze how institutional factors (e.g., resources, teaching methods, support systems) in public and private HEIs interact to shape the educational environment and, ultimately, student achievement. By examining these interactions, the study aims to identify systemic strengths and weaknesses in both types of institutions and propose targeted interventions for improvement.

2.3.3. Institutional Theory:

Institutional theory is a sociological perspective that focuses on the ways in which institutions shape behavior, organizations, and society as a whole. It examines how formal and informal rules, norms, and beliefs influence the actions and practices of individuals and groups within a social system (Amenta & Ramsey, 2010). Institutional theory suggests that institutions, which can be formal organizations, laws, regulations, or social customs, exert powerful influences on individuals and organizations by providing a set of established rules and expectations. These rules and expectations guide behavior, shape decision-making processes, and influence the structures and practices of organizations (Tina Dacin et al., 2002). Institutional theory has been applied to various fields, including organizational studies, economics, political science, and public policy. It provides insights into how institutions shape behavior, organizational practices, and societal outcomes, and it helps explain the persistence and change of institutions over time (Scott, 2005).

This theory explores the influence of organizational structures, norms, and values on the behavior and practices of institutions. It also explores the dynamics and structures within organizations, including higher education institutions (Jones & Jones, 2013). It can provide insights into how institutional policies, leadership, and governance impact the educational environment, resource allocation, and overall quality of education. It can be used to analyze the differences in the educational environments between public and private institutions and how their institutional characteristics shape the delivery of health professionals' education. Institutional theory has also been applied in the study of health professionals' education in both public and private higher education institutions. According to institutional theory, organizations conform to the norms and expectations of their institutional environment to gain legitimacy and secure resources (Scott, 2014). In the context of health professionals' education, this theory suggests that institutions may adopt similar curricula, teaching methods, and accreditation standards in order to conform to the expectations of the accrediting bodies and professional organizations. Overall, institutional theory provides a useful framework for understanding the dynamics of health professionals' education in both public and private institutions.

2.3.4. Integration of Theories in the Study

The integration of constructivist learning theory, systems theory, and institutional theory offers a multidimensional framework for examining the educational environment and its influence on student achievement in health professions education. Constructivist learning theory underscores the active engagement of students in constructing knowledge through interaction with a supportive and meaningful learning context. Systems theory complements this by emphasizing the dynamic interrelationships among various components of the educational system including

curriculum design, faculty roles, administrative policies, and resource allocation that collectively shape student learning outcomes. Adding institutional theory further deepens this analysis by focusing on the formal and informal rules, norms, and structures that govern educational institutions. It provides insight into how institutional pressures, such as regulatory standards, accreditation requirements, and organizational culture, influence the behavior of educational actors and the implementation of pedagogical practices. Together, these theoretical perspectives enable a comprehensive understanding of both the micro-level learning processes and the macro-level institutional dynamics, thus providing a solid conceptual foundation for the study's objectives, design, and methodological approach.

2.4. Health Professionals Education: Global and Regional Context

The landscape of health professions education (HPE) has undergone profound transformation over the past two decades. Globalization, demographic shifts, technological innovation, and changing disease burdens have driven educational reform aimed at producing a workforce fit for 21st-century health systems. Health professions education research and program development have expanded substantially. Empirical studies published in top journals between 2000 and 2020 demonstrate not only growth in volume but also diversification in research topics and methods, reflecting a broadening scope of disciplinary and methodological inquiry within the field. Topics such as pedagogical innovation, competencies, and interprofessional models are increasingly prioritized over traditional didactics. Yet, methodological quality and geographic diversity remain uneven, with most research originating from North America and Europe (Sarkar et al., 2024).

Post-COVID-19 disruption spurred innovations that are likely to persist. These include competency-based education, interprofessional education (IPE), longitudinal integrated clinical experiences, community and public health orientation, and lifelong learning frameworks. Interprofessional models, in particular, aim to better prepare graduates for collaborative, team-based care as a response to the complex demands of modern health systems (El Naggar & El Naggar). Technologies such as artificial intelligence (AI), virtual simulation, and augmented reality are reshaping training environments. Reviews identify human-AI collaboration, virtual patient simulation, and adaptive learning technologies as key future directions, with implications for curriculum design and educator competencies. These tools hold promise for improving access, personalization, and experiential learning, especially in resource-limited settings (Bashiryejad et al., 2025). Taken together, these trends indicate a shift away from traditional, discipline-centric training toward systems-oriented, collaborative, adaptive, and technology-enhanced education that aligns with global health needs.

2.5. Health Professionals Education Landscape in Ethiopia

This section presents an overview of the healthcare professionals' education landscape in Ethiopia, highlighting the various healthcare programs available and the regulatory bodies responsible for accreditation and licensure. It explores the roles and contributions of both public and private higher education institutions in training healthcare professionals and meeting the country's healthcare workforce needs. It emphasizes that at the heart of every health system lies the interaction between individuals seeking services and those entrusted with providing them, transcending the allure of modern technology. This trust is built upon a unique combination of technical expertise, service-oriented mindset, guided by ethical principles and social responsibility, which constitute the essence of professional practice(Callahan, 1973). Therefore, equipping healthcare professionals for such demanding roles necessitates a comprehensive and extensive period of education, which entails a significant investment from both students and society(Frenk et al., 2010a). To improve the quality of health service, effective and well-designed health professional education is essential(Zodpey et al., 2018). Education is a crucial component for the development of any country. Higher education is widely considered a significant factor in this aspect (Đonlagić & Fazlić, 2015).

The higher education system plays a crucial role in the overall progress of a country, including social, economic, and industrial advancements (Ramli et al., 2018). It is a process that develops human abilities, skills, and moral values, leading to improved standards and qualities of life. Higher education institutions (HEIs) are essential investments that serve multiple purposes, such as preparing individuals for their career paths, providing centers of learning, and facilitating personal development. HEIs also contribute to the growth and development of industries and individuals through flexible education offerings. Research indicates that attaining higher levels of education is associated with increased income for both men and women, leading to a reduction in unemployment rates and poverty levels (Wubshet & Engida, 2012). Furthermore, obtaining higher levels of education is linked to increased levels of civic engagement, encompassing community service and volunteerism. Universities and other higher education institutions (HEIs) play a crucial role in enriching national education systems across diverse domains(Ramli et al., 2018).

Health professional education is one area of study in higher education. Health professional education is a field of study in higher education that aims to transform clinicians and healthcare professionals into competent educators who can guide and instruct students, residents, and fellows in their respective fields (Hwang & Kuo, 2018). The primary objective of health professional education is to produce skilled health workers at all levels of the healthcare system

who can work together to ensure universal healthcare coverage and promote the advancement of health for all. The field of health professional education is evolving rapidly in response to changing patient demands, healthcare systems, and technologies worldwide (Africa, 2018).

Health science education can take place in various settings, such as universities, colleges, vocational schools, and healthcare institutions. The programs offered can range from certificate and diploma programs to undergraduate and graduate degrees. Additionally, continuing education and professional development opportunities are available to healthcare practitioners to enhance their knowledge and skills throughout their careers (Leminie & Mekasha, 2025).

Health science education plays a vital role in preparing healthcare professionals to meet the evolving needs of the healthcare industry. It equips students with the knowledge, skills, and attitudes necessary to provide compassionate, evidence-based, and patient-centered care. As healthcare continues to advance and new challenges emerge, health science education remains essential in shaping competent and compassionate healthcare professionals (Leinster, 2002).

Health professionals bear the responsibility of upholding human well-being through the application of evidence-based medicine and compassionate care. Their scope of work encompasses studying, diagnosing, treating, and preventing illnesses, injuries, and various physical and mental impairments, tailored to the specific requirements of the populations they serve (Organization, 2013; Zodpey et al., 2018). In addition, health professionals offer guidance on preventive and curative measures while promoting overall health, aiming to fulfill the health needs and expectations of individuals and communities, ultimately leading to improved population health outcomes. Furthermore, they actively engage in research, advancing concepts, theories, and operational methodologies to further enhance evidence-based healthcare practices (Organization, 2013). Health professionals play a crucial role in ensuring the well-being of individuals, communities, and nations. The quality of education received by health professionals is a critical determinant of their competence, which, in turn, impacts the quality of health care provided to patients (Organization, 2013).

Health science education in Ethiopia has undergone significant evolution over the years (Mekasha, 2020). The country has made great strides in developing its healthcare system and ensuring that its healthcare professionals are well-trained and equipped to meet the needs of the population (Massy, 2003). In the past, health science education in Ethiopia was limited, with only a few medical schools and nursing programs available. However, in recent years, there has been a concerted effort to expand and improve the quality of health science education in the country (Derbew et al., 2014; Mekasha, 2020).

One of the key developments has been the establishment of new medical schools and nursing colleges across the country. This has increased the number of healthcare professionals being trained and has helped to address the shortage of doctors and nurses in many areas (Mekasha, 2020). Furthermore, there has been a focus on enhancing the curriculum and training methods in health science education. Efforts have been made to align the education programs with international standards and best practices. This includes incorporating practical training, clinical rotations, and research opportunities into the curriculum, ensuring that students are well-prepared for real-world healthcare settings (Anderson et al., 2011; Kebede Kassahun, 2012).

Another significant development has been the emphasis on community-based education and primary healthcare. Ethiopia has recognized the importance of training healthcare professionals who can effectively serve rural and underserved communities. As a result, there has been a shift towards training students in community settings, allowing them to gain firsthand experience in addressing the unique healthcare challenges faced by these populations ((FMOH), 2021; Mullan, 2016).

Additionally, the government has implemented various scholarship programs and initiatives to support aspiring healthcare professionals. This has helped to increase access to health science education for students from disadvantaged backgrounds and has contributed to a more diverse healthcare workforce((FMOH), 2021).

Health professionals encounter numerous challenges within the education systems of many African countries. These challenges stem from variations in curriculum, learning environments, and enrollment criteria brought about by ongoing changes(Africa, 2018). One of the notable issues faced by health professionals is the growing number of public complaints regarding the quality of services provided by this field, leading to a decline in the public's perception of healthcare. Moreover, the constant advances in scientific knowledge and technology, shifting social attitudes and values, expanded professional roles, internal and external pressures, and the emergence of new disease patterns impose additional burdens on the already dwindling skilled health workforce (Mullan, 2016).

In our context, several factors significantly impact the quality of health professionals education, leading to subpar performance during the academic years and a rise in licensure examination failures among health professional students(Bearman, 2015; Knebel & Greiner, 2003). This situation not only causes frustration among students and parents but also has far-reaching consequences for society as a whole. Factors such as curriculum organization, learning environment, clinical teaching methods, socio-economic factors, personal factors, and even

politically oriented influences have an adverse impact on student performance((FMOH), 2021; Mosadeghrad, 2014). Additionally, limited opportunities for training in hospital settings, underqualified faculty members, and excessive student enrollment in certain programs further contribute to the negative effects on health science training programs((WHO), 2013; Curran et al., 2006; Leinster, 2002).

In today's world, the context, content, and conditions surrounding the collective endeavor to educate capable, compassionate, and dedicated health professionals are undergoing rapid transformations on a global scale(Frenk et al., 2010b). Health science professionals are carried out in health science universities or health science colleges that enroll from high schools. There are numerous challenges to health professional education in the world. Those challenges are worsened in developing countries related of poverty and different administrative problems(Zodpey et al., 2018). Based on previous literature, systemic issues have been identified in the field(Burdick, 2007). These include a mismatch between competencies and the needs of patients and populations, challenges in fostering effective teamwork, persistent gender disparities in professional status, a narrow focus on technical skills without a broader contextual understanding, fragmented care rather than a continuous approach, an excessive emphasis on hospitals at the expense of primary care, imbalances in the quantity and quality of the professional labor market, and a lack of strong leadership to enhance health system performance(Frenk et al., 2010b; Murray, 2010).

Professional education has not adequately adapted to these evolving challenges, primarily due to fragmented, outdated, and rigid curricula that fail to equip graduates with the necessary skills. Given the assessment of the present circumstances and the challenges faced in health professional education, it is imperative and opportune to redesign and propose a new framework that aligns with the requirements of 21st-century education(Frenk et al., 2010a; Obadeji, 2019). This is particularly crucial due to the opportunities presented by global interdependence, which facilitates mutual learning and collaborative solutions through the accelerated exchange of knowledge, technologies, and financial resources across borders. Additionally, the migration of both professionals and patients plays a significant role in addressing these challenges and enhancing the quality of healthcare services(Frenk et al., 2010a; Services & Institute, 2010).

The ultimate objective of proposing a redesign and new framework is to foster the development of healthcare practitioners who are capable of effectively addressing the existing challenges and spearheading a comprehensive transformation of the healthcare system. This transformation aims to create a more efficient, patient-centered, and effective healthcare organization while ensuring the cultivation of competent and skilled health professionals(Bhutta et al., 2010). The quality of

health professionals education is a critical factor in the production of competent and ethical health professionals who can meet the needs of their communities (Knebel & Greiner, 2003; Organization, 2013). Quality education in health science is vital for producing competent healthcare professionals who possess the necessary knowledge, skills, and competencies to excel in their respective roles (Starr et al., 2016). Through comprehensive and rigorous education programs, healthcare professionals are equipped with a solid foundation of theoretical knowledge and practical skills. This enables them to navigate complex healthcare scenarios, make accurate diagnoses, and develop effective treatment plans. Competent healthcare professionals are essential for delivering safe and quality care to patients (Organization, 2013).

Patient safety and quality care are paramount in healthcare. Quality education ensures that healthcare professionals are trained to prioritize patient safety and adhere to best practices and guidelines. They learn about infection control measures, medication safety protocols, and patient assessment techniques (McNulty et al., 2012; Organization, 2013). By understanding and implementing these principles, healthcare professionals minimize the risk of errors, adverse events, and patient harm. Quality education instills a commitment to providing evidence-based and patient-centered care, resulting in improved patient outcomes and satisfaction (Cristobal & Worley, 2011).

In the rapidly evolving field of healthcare, keeping up with advancements is crucial. Quality education equips healthcare professionals with the knowledge and skills to stay abreast of the latest research findings, technological advancements, and treatment modalities (Cristobal & Worley, 2011). They learn to critically evaluate emerging trends and integrate new knowledge into their practice. This ensures that healthcare professionals are competent in utilizing innovative tools, techniques, and therapies to improve patient care and outcomes. By staying current with advancements, healthcare professionals can provide the most effective and up-to-date care to their patients (Anderson et al., 2011).

Healthcare is a multidisciplinary field that relies on collaboration and teamwork. Quality education promotes interdisciplinary collaboration, enabling healthcare professionals from different disciplines to work together effectively (McPherson et al., 2001). Through interdisciplinary coursework, simulations, and clinical experiences, healthcare professionals learn to communicate, respect, and understand the expertise of their colleagues. This collaborative approach leads to improved patient care, as different perspectives and skills are integrated to provide comprehensive and holistic care. By fostering interdisciplinary collaboration, quality education strengthens the healthcare workforce and enhances the overall quality of care provided to patients (Anderson et al., 2011; Engum & Jeffries, 2012).

Research and innovation are essential for advancing healthcare. Quality education in health science instills a culture of research, critical thinking, and innovation among healthcare professionals (Shekelle et al., 2005; Soyege et al., 2024). They learn to critically evaluate research literature, design and conduct studies, and contribute to the scientific knowledge base. By engaging in research, healthcare professionals can identify gaps in knowledge, develop new treatments and interventions, and improve healthcare delivery models. Quality education encourages healthcare professionals to adopt evidence-based practices, engage in continuous quality improvement, and contribute to the ongoing advancement of the field (Anderson et al., 2011).

Healthcare disparities exist among different populations, and quality education plays a crucial role in addressing these disparities. By emphasizing cultural competence, social determinants of health, and patient-centered care, quality education equips healthcare professionals to provide equitable care to individuals from diverse backgrounds (Bau et al., 2019; Like et al., 2008). They learn to recognize and address the unique healthcare needs and challenges faced by different populations. Quality education promotes inclusivity, diversity, and sensitivity in healthcare practice, helping to reduce healthcare disparities and improve health outcomes for all individuals and communities (Organization, 2013; Renzaho et al., 2013).

Investing in quality education is vital for strengthening the healthcare workforce and improving the overall health and well-being of individuals and communities. By providing comprehensive and evidence-based education, we ensure that healthcare professionals are competent, skilled, and equipped to deliver safe and quality care (Bendermacher et al., 2021). Quality education fosters a culture of continuous learning, innovation, and collaboration (Stalmeijer et al., 2023). Enabling healthcare professionals to adapt to changing healthcare landscapes and provide the best possible care to their patients. Ultimately, by investing in quality education, we contribute to building a stronger healthcare system and promoting the health and well-being of individuals and communities (Anderson et al., 2011; Stuart & Triola, 2015).

In Ethiopia, the quality of health professionals education has been a concern, with reports of inadequate faculty qualifications, outdated curricula, and inadequate resources in both public and private institutions (Teshome, (2019)). This study will focus on institutions of higher education that offer professional degrees in health professional education like medicine, public health, nursing, midwifery, radiology technology and others in public or private higher education institutions in Ethiopia.

The history of Ethiopian health education policy can be divided into three main periods(Ethiopia, 1993): the Imperial regime (pre-1974), the Dergue regime (1974-1991), and the post-Dergue regime (1991-present). During the Imperial regime, there was limited access to healthcare, and the government focused on preventive medicine and basic curative skills. The Dergue regime emphasized rural healthcare, disease prevention, and community involvement. Following the overthrow of the Dergue regime, a new health policy was formulated in 1993, with a focus on disease prevention, rural areas, and community engagement. In recent years, Ethiopia has expanded health professional education, but still faces challenges such as infrastructure, faculty recruitment, and aligning education with community needs(Ethiopia, 1993; Mekasha, 2020).

Over the course of several decades, health professionals' education in Ethiopia has achieved significant milestones(Derbew et al., 2014; Mekasha, 2020; Pankhurst, 1990). Initially focused on traditional healers and midwives, formal education began with the establishment of Gondar Public Health College in 1954, followed by the renowned Faculty of Medicine at Addis Ababa University in 1962. The Ethiopian Health Science College was founded in 1979, providing comprehensive training for various health professionals. In 1995, the Health Extension Program (HEP) was introduced to train health extension workers (HEWs) in rural areas. The Health Center Reform in 2007 aimed to strengthen the healthcare system and improve professional training, while the establishment of the Ethiopian Public Health Institute (EPHI) in 2012 advanced public health education and research(Mekasha, 2020; Webb, 1957). Currently, Ethiopia has numerous universities and colleges offering health professionals education with updated curricula. Ongoing efforts persist to expand training opportunities, improve education quality, and address workforce distribution challenges in the country.

The Health Professionals' Education and Training Policy in Ethiopia is a comprehensive document that outlines the guidelines and standards for the education and training of health professionals in the country(Ethiopia, 1993). This policy outlines the guidelines and standards for health professionals' education and training in Ethiopia. The policy aims to ensure the production of competent and skilled health professionals who can effectively contribute to the delivery of quality healthcare services in Ethiopia. The Health Professionals' Education and Training Policy in Ethiopia serves as a guiding framework for the development and improvement of health professional education programs in the country. It aims to enhance the quality and relevance of education, promote continuous professional development, and ultimately contribute to the improvement of healthcare services and population health outcomes(Ethiopia, 1993; Mekasha, 2020).

2.6. Educational Climate in Health Science Education

This section explores the assessment of the educational environment in public and private higher education institutions offering health professionals' education internationally as well as in Ethiopia. It examines studies that have assessed the learning climate, faculty-student interactions, availability of resources, and support systems in both sectors (Kebede Kassahun, 2012). The review underscores the significance of the educational environment in shaping students' learning experiences, their readiness for licensure examinations, and their subsequent professional practice. In recent years, there has been a growing interest and concern surrounding the role of the learning environment in undergraduate medical education. The educational environment stands as one of the most crucial factors in determining the success of an effective curriculum (Altemani & Merghani, 2017).

The term "educational environment" encompasses all the elements that influence the learning process of students, including the physical setting, instructors, peers, and overall culture. It refers to everything that takes place within the classroom, department, faculty, or university, which plays a vital role in shaping the success of undergraduate medical education (Altemani & Merghani, 2017; Dimitrova et al., 2018; Jawaaid et al., 2013). It encompasses various factors that shape the educational experience and impact student engagement, motivation, and achievement. Key dimensions of the educational climate include the physical environment (classrooms, libraries, etc.), social environment (interactions and relationships), teaching and learning practices, institutional policies and support systems, cultural and ethical considerations, and institutional leadership and governance (Jamaiah, 2008).

The educational climate is dynamic and requires a comprehensive approach to assessment and improvement. By addressing its multifaceted nature, institutions can create an environment that supports student success and prepares them for their future roles. The educational climate profoundly impacts students, educators, and the overall educational outcomes (Mohsena et al., 2016a). In 1998, the World Federation for Medical Education identified the assessment of the learning environment as one of the key areas of focus in evaluating medical education programs (Education, 1998). The quality of the educational environment has been recognized as a critical factor for facilitating effective learning (Divaris et al., 2008). The environment, encompassing educational, organizational, and contextual aspects, serves as the primary embodiment and conceptualization of the curriculum within the medical school (Black et al., 2012). It encapsulates everything that transpires within the institution and significantly influences the learning experience of students (Abraham et al., 2008).

The learning environment plays a significant role in shaping behavior, with various elements within the educational setting being closely linked to academic achievement, course satisfaction, and aspirations(Makhdoom, 2009). The DREEM (Dundee Ready Education Environment Measure) has been widely employed in numerous countries, providing validated, comprehensive assessments and diagnostic analyses of educational environments on a global scale. The DREEM tool is a validated, 50-item questionnaire designed to assess the educational environment in health professions education. It measures five domains: Perception of Learning, Perception of Teachers, Academic Self-Perception, Perception of Atmosphere, and Social Self-Perception(Roff et al., 1997b). DREEM is widely used due to its reliability and ability to provide actionable insights into the strengths and weaknesses of educational environments(He & Wang, 2020). Studies have applied DREEM across various disciplines, including medicine, nursing, pharmacy, and allied health, to evaluate and compare educational settings(Miles et al., 2012).

Findings from a study conducted in Bangladesh revealed that students generally hold positive perceptions of their course environment. However, areas such as curriculum content, teacher-student interactions, teaching atmosphere, and the social support system were identified as key areas that require further improvement(Mohsena et al., 2016b). Another study conducted in Bangladesh highlighted the need for targeted remedial interventions to improve students' perceptions of both the educational atmosphere and their social self-perceptions. The findings suggest that while some progress may have been made, significant efforts are still required to foster a more supportive and engaging learning environment. Enhancing these aspects is essential for promoting students' overall satisfaction, well-being, and academic success within health professions education(Nahar et al., 2010b). The study conducted in Kuwait revealed that students' perceptions of the educational environment at the Faculty of Medicine, Kuwait University (FOMKU) were less than optimal. These suboptimal evaluations underscore existing gaps that may hinder students' academic engagement, motivation, and overall educational experience. Therefore, it is crucial for medical educators and institutional leaders in Kuwait to implement targeted improvements aimed at enriching the learning environment. Such enhancements are vital not only for elevating the quality and relevance of the curriculum but also for fostering better academic outcomes, professional development, and student well-being(Karim et al., 2015). The study conducted in India discovered that first-year students exhibited greater satisfaction with the learning environment compared to clinical batch students. Furthermore, the study revealed that gender did not have a significant influence on students' perceptions of the learning environment (Abraham et al., 2008).

However, the study conducted in Saudi Arabia demonstrated that female students had significantly better perceptions of the educational environment compared to male students (Altemani & Merghani, 2017). Research has shown that the educational environment can have a significant impact on the performance of medical students on licensure examinations (Miotto, (2014)). Several interrelated factors such as faculty qualifications, curriculum structure, pedagogical approaches, and the adequacy of academic and clinical resources play a critical role in shaping students' learning experiences and ultimately their performance in licensure examinations. A well-qualified teaching staff, for example, contributes to effective knowledge transfer and mentorship, while a student-centered and contextually relevant curriculum enhances engagement and critical thinking. Furthermore, access to well-equipped learning environments and clinical training facilities ensures that theoretical knowledge is effectively translated into practice.

The educational climate, particularly the clinical learning environment (CLE), plays a critical role in shaping students' academic experiences and professional development within health science education. Several recent studies in Ethiopia have investigated students' perceptions of their educational environment, revealing both strengths and persistent challenges that affect learning outcomes and student satisfaction.

A cross-sectional study conducted among medical and health science undergraduate students reported that only 50% of the participants were satisfied with their clinical learning environment. The study identified positive perceptions of the university infrastructure and curricular design, as well as older student age, as key predictors of higher satisfaction levels. Based on these findings, the authors recommended targeted interventions, including improving infrastructure, upgrading clinical placement facilities, enhancing dormitory conditions, and increasing student involvement in curriculum review processes, to improve both educational satisfaction and student performance (Ayenew et al., 2024).

In another institutional assessment using the Dundee Ready Education Environment Measure (DREEM), researchers recorded an overall score of 111.3 out of 200, suggesting a learning environment that was “more positive than negative.” Notably, female students scored significantly higher in domains such as teaching and atmosphere, indicating possible gender-based differences in how the educational climate is experienced. Furthermore, students in earlier clinical years reported more favorable perceptions than final-year interns, highlighting a potential decline in satisfaction as students advance in their training. Key problem areas identified included unfavorable ward environments and elevated levels of stress, particularly in clinical settings, which may adversely affect both learning and well-being (Gedamu et al., 2024).

In contrast, a qualitative study focusing on nursing students at government universities revealed a generally negative perception of the educational climate. Participants cited several deficiencies, including inadequate instructional resources, poor teaching quality, limited access to practical training facilities, and substandard support services such as housing and transportation. These conditions were perceived as significant barriers to effective learning and professional preparation, ultimately undermining the quality of nursing education (Fego et al., 2022).

Encouragingly, signs of progress have been observed in specific programs. A comparative study examining anesthesia education programs at the University of Gondar and Debre Tabor University found that the transition toward competency-based and student-centered curricula is gradually reshaping the learning environment. Students in these programs generally reported a more positive educational climate, although notable variations were observed between institutions and curricular formats. These findings suggest that curricular reforms and institutional innovation can contribute meaningfully to enhancing the learning environment, particularly in newly emerging or specialized health programs (Negash et al., 2022).

Collectively, these studies underscore the diverse and evolving nature of the educational climate in Ethiopia's health science education sector. While positive trends are emerging particularly in institutions adopting modern pedagogical models several systemic challenges remain, including resource limitations, instructional gaps, and clinical placement inadequacies. Addressing these issues through evidence-informed reforms, stakeholder engagement, and sustained investment in educational infrastructure is essential for improving the quality of health professional education in Ethiopia.

The UK Standing Committee on Postgraduate Education (1991) emphasized the significance of the educational environment in their statement report. They highlighted that a supportive and conducive environment has a positive and substantial influence on students' learning, academic advancement, successful training, and overall well-being (Council, 2009). It is widely acknowledged that a positive learning environment during undergraduate education has the potential to contribute to higher levels of satisfaction, achievement, and success as a practitioner (Brown et al., 2011).

In order for educationalists to deliver the highest quality of teaching to their students, it is essential to establish a conducive learning environment. This can be accomplished by identifying and addressing any weaknesses or shortcomings within the existing environment (Helal et al., 2013). The perception of students regarding the educational environment serves as a valuable foundation for modifying and enhancing its quality. The Dundee Ready Education Environment

Measure (DREEM) was developed as a tool to assess and measure the medical and health education environment (Roff et al., 1997b). DREEM underwent testing and validation across multiple continents, including Europe, Africa, Asia, Australia, and America (J. J. M. t. Genn, 2001). DREEM is a culture-independent instrument that has been translated into multiple languages and utilized in numerous countries worldwide (Pai et al., 2014). The DREEM questionnaire has been employed in numerous countries, resulting in validated global readings and diagnostic analyses of educational environments. According to the DREEM questionnaire, students' perceptions of educational environment items were divided into five sub-scales.

2.7. Student Achievement in Health Science Education programs

This section focuses on the performance of graduates from public and private higher education institutions on licensure examinations internationally and in Ethiopia. It reviews and analyzes studies that have examined the pass rates, knowledge levels, and clinical competencies of graduates from both sectors. Factors such as curriculum alignment with examination requirements, teaching quality, and clinical exposure are considered in understanding the variations in performance.

The performance of undergraduate medical students on licensure examinations is a critical measure of their readiness and competence to practice as health professionals (Gauer & Jackson, 2019). However, recent years have witnessed a consistent pattern of low performance among students, raising concerns about the effectiveness of health professionals' education and the educational environment provided by higher education institutions (Jeyaraju et al., 2023). This section examines existing research and scholarly literature related to the low performance of undergraduate medical students on licensure examinations, with a particular focus on comparative studies between public and private high. Factors influencing student performance on licensure examinations: Numerous factors have been identified in the literature as potential contributors to the low performance of undergraduate medical students on licensure examinations (Chisholm-Burns et al., 2021b; Jeyaraju et al., 2023). These factors can be broadly categorized into individual, educational, and institutional factors.

Individual factors include personal characteristics, motivation, study habits, and self-directed learning skills (Briones, 2021; Briones & Romero, 2020). Educational factors encompass curriculum design, teaching and learning methods, assessment practices, and the integration of clinical experiences. Institutional factors involve the organizational culture, resources, faculty support, and the learning environment within the medical education institutions (Abdulmajid, 2024; Chisholm-Burns et al., 2021a).

Student achievement in health science education refers to the academic performance, competency, and accomplishments of students pursuing studies in health science disciplines(Kassa & Bogale, 2020). It encompasses various aspects, including academic excellence, clinical proficiency, critical thinking skills, and professional competencies(Zughoul et al., 2018). Student achievement is measured through assessments, evaluations, examinations, and practical experiences, which demonstrate their knowledge, skills, and readiness to enter the healthcare field(Kassaw & Demareva, 2023). This achievement is important as it reflects the students' ability to provide high-quality patient care, meet the standards set by accrediting bodies and licensing boards, pursue career opportunities, engage in lifelong learning, and contribute to the overall excellence and professionalism in the healthcare industry (Hamaideh & Hamdan-Mansour, 2014).

Student achievement in health science education is crucial for several reasons(Abdulghani et al., 2014). Firstly, it directly impacts patient care quality by ensuring that healthcare professionals possess the necessary expertise and knowledge to deliver effective and evidence-based services(Mills et al., 2009). Secondly, student achievement reflects their competence and readiness for the healthcare workforce, as they acquire the skills, critical thinking abilities, and clinical judgment required for their respective disciplines. Moreover, student achievement plays a significant role in program accreditation and licensure, serving as evidence of program effectiveness and eligibility for professional practice(Geletu & Belay, 2024). Additionally, health science education provides a foundation for ongoing professional development and lifelong learning, emphasizing the importance of staying updated with advancements in the field(Regmi & Jones, 2020). Furthermore, student achievement influences career opportunities and advancement, as employers value academic excellence and clinical competency(Pshembayeva et al., 2022). Lastly, student achievement contributes to personal satisfaction, motivation, and self-confidence, fostering a commitment to excellence and continuous growth(Al-Hebaish, 2012; Aljohani et al., 2016; Silitubun, 2023). Overall, student achievement is vital in health science education, impacting patient care, competence, career prospects, and personal development (Marić & Sakač, 2014).

Health professional education is crucial in building a robust and competent healthcare workforce to deliver quality healthcare services to the population(Knebel & Greiner, 2003; Services & Institute, 2010). Licensure examinations serve as a benchmark to evaluate the knowledge, skills, and competencies of medical graduates and determine their readiness to enter professional practice (Organization, 2013). However, the consistently low performance of undergraduate health science students on licensure examinations raises concerns about the effectiveness of

health professional education and the educational environment provided to them(Gullo et al., 2015). It is crucial to identify the factors that contribute to low performance and areas with potential for improvement in both public and private higher education institutions(Jeyaraju et al., 2023).

Performance serves as a visible demonstration of an individual's well-considered ideas, services, thoughts, and knowledge, with grades representing the measure of students' achievements (Yousafzai et al., 2021). Academic performance is measured by a student's knowledge and grades in school, and it is affected by various factors (Chisholm-Burns et al., 2021a). Achievement is a function of both skill and will, and both must be considered individually since having the will alone may not guarantee success if the skill is lacking(López et al., 2019). Academic achievement is an important area of research in educational systems, and many factors affect students' performance, including the educational environment (Kobal et al., 2001). To improve academic achievement, it is essential to identify factors that influence student performance in the classroom(Makhdoom, 2009). Students' learning outcomes and achievement scores can be assessed based on factors such as family background, educational institution, motivation, and societal influences(Munir et al.).

The performance of graduates in licensure examinations is often cited as one of the frequently mentioned indicators of the quality of higher education programs in the country (Camuyong et al., 2022; Quiambao et al., 2015). The licensing examination represents one of the final challenges that aspiring health professionals must overcome in the licensing process(Norcini et al., 2014). In Ethiopia, the Ministry of Health (MoH) bears the ultimate responsibility for ensuring that the examination adheres to technical, professional, and legal standards. Its purpose is to safeguard the health, safety, and welfare of the public by assessing the competencies of health professional candidates and their ability to practice proficiently((FMOH), 2021). Once a candidate successfully passes the licensing examination, the MoH can confidently grant them a license, assuring the public that the licensee possesses the minimum qualifications required for initial licensure. Licensing is a necessary requirement to ensure that only qualified health professionals are eligible for employment((FMOH), 2021). This process can create anxiety not only for the examinees themselves but also for educational institutions that produce prospective health professionals with various specializations(Norcini et al., 2014).

Student achievement in health science education is a multifaceted outcome shaped by academic, personal, and contextual factors. In the Ethiopian context, recent studies have examined the predictors of academic success across various institutions and disciplines, offering critical insights into the determinants of student performance.

A mixed-methods study conducted at Hawassa University (2024) investigated the dynamic factors influencing academic performance among 238 undergraduate health science students. The study identified several sociodemographic determinants, including gender, parental education level, socioeconomic status, quality of high school attended, university admission scores, and language of instruction, all of which significantly influenced students' academic outcomes. Beyond these, the study also emphasized motivation, perceived competence, and commitment on the part of students, instructors, and university administrators as crucial elements in shaping achievement. The researchers concluded that the enhancement of student performance requires a holistic educational approach, including high-quality academic inputs, effective teaching and learning processes, and comprehensive student support systems (Geletu & Belay, 2024).

In a broader institutional context, a 2023 study published in BMC Medical Education assessed academic performance among 292 preclinical medical students across four Ethiopian medical schools implementing the New Medical Education Initiative (NMEI). The findings revealed that academic stress was a significant negative predictor of performance. Conversely, students who entered medical school with a prior health science background performed better than their counterparts from other fields. Additionally, prior academic achievement, measured by cumulative grade point average (CGPA) and university entrance examination (UEE) scores, were strong positive predictors of student success. Qualitative data gathered through interviews further validated these quantitative findings, highlighting the need for careful consideration of admission criteria, academic preparedness, and stress management strategies in health professional education (Gebru & Verstegen, 2023).

Similarly, a 2023 cross-sectional study at the University of Gondar involving 222 undergraduate medical students found that UEE scores significantly predicted both preclinical and fifth-year GPAs, accounting for approximately 32.7% and 24.4% of the variance, respectively. Beyond cognitive predictors, prior knowledge of the medical profession and intrinsic motivation such as a genuine interest in helping others were also significantly associated with higher academic achievement. The study underscored the need for a more comprehensive admissions framework that evaluates non-cognitive attributes alongside traditional academic metrics to better identify students with the potential for long-term success in health sciences (Bekele et al., 2023).

At Jimma University, a 2021 cross-sectional survey among 147 midwifery and nursing students assessed clinical learning outcomes as a proxy for academic performance in applied settings. Only 44.2% of students met expected clinical competencies, indicating significant gaps in practical achievement. However, performance was higher among third-year students, those who

reported strong motivation, and those who adhered to COVID-19 preventive practices suggesting that maturity, commitment, and responsible behavior are linked with better performance. Interestingly, students who experienced higher clinical site workloads also demonstrated better clinical outcomes, possibly due to increased hands-on exposure, although this finding warrants further investigation (Angasu & Bekela, 2021).

Lastly, a 2024 BMC Medical Education report examined student achievement across Eastern Ethiopian universities. The study is expected to align with established research trends, exploring performance metrics and associated factors such as academic preparedness, institutional support, and student motivation (Hailu et al., 2024).

Together, these studies paint a comprehensive picture of the multi-layered determinants of student achievement in Ethiopian health science programs. Core predictors such as prior academic performance, motivation, and background in health sciences are consistently linked to success, while stress, institutional resource gaps, and inadequate clinical training environments continue to pose barriers. These findings highlight the need for evidence-based reforms in admissions, curriculum design, and student support systems to promote academic success and professional competency in the country's health workforce.

Licensure is a regulatory process through which a governmental authority typically the Ministry of Health (MoH) and corresponding regional regulatory bodies evaluates and certifies the competency of individuals aspiring to practice within a defined professional scope. This certification process generally involves the assessment of an applicant's educational qualifications, clinical training, relevant professional experience, and performance on standardized licensure examinations. Upon satisfactory demonstration of competence, the MoH and regional authorities confer legal authorization, granting individuals the exclusive right to practice within a specified field while restricting unqualified individuals from engaging in such activities ((WHO), 2013).

In addition to granting practice rights, licensure serves as a mechanism for ensuring public safety and maintaining professional standards. Regulatory bodies retain the authority to impose disciplinary measures including suspension or revocation of licensure on practitioners who violate statutory or ethical standards. Moreover, these authorities are empowered to take legal actions against individuals who practice without a valid license, thereby safeguarding the integrity of healthcare services and protecting patients from unqualified or unethical practice ((WHO), 2013).

2.8. The relationship between educational climate and student achievement in Health Science Programs

The educational climate holds a profound influence over students' academic success, personal growth, and overall well-being. A nurturing and positive educational environment fosters student engagement, motivation, and a sense of belonging (Dimitrova et al., 2018). It also stimulates critical thinking, collaborative skills, and a lifelong love of learning (Dimitrova et al., 2018). Beyond these immediate impacts, a favorable educational climate equips students to become responsible citizens, effective communicators, and adaptable professionals in their chosen fields, laying the groundwork for enduring commitment to growth and success (Greenway, 2017).

In the realm of health science programs, the educational climate's role is pivotal, significantly shaping students' experiences and their future in healthcare (Samdal et al., 1998). This discussion explores the impact of educational climate on diverse aspects of the student journey, including engagement levels, learning outcomes, professional identity formation, interprofessional collaboration, student well-being, professionalism, and the cultivation of lifelong learning (Africa, 2018). It illuminates the benefits of cultivating a positive and supportive climate, both for students and the quality of patient care.

The existing literature highlights the significance of students' positive perceptions of the educational environment in shaping their learning experiences and academic accomplishments (Abdulla, 2014; Sarwar & Tarique, 2016; Sengupta et al., 2017). Conversely, when students perceive mistreatment or hold negative views about their educational environment, it can adversely affect their motivation for learning and overall mental well-being. Studies have indicated that mistreated students may experience negative emotions, burnout, and a decline in performance (Pitanupong & Sathaporn, 2019; Sathaporn & Pitanupong, 2021, 2022). The acquisition of knowledge, skills, and the development of a positive attitude among students are inherently connected to their perceptions of the educational environment (Cote & Levine, 1997). Therefore, evaluating the educational environment holds significant importance as it has the potential to greatly enhance students' academic achievements and the competence of future health science professionals (Lizzio et al., 2002). A study conducted in the USA identified a notable positive correlation between school climate and student achievement in middle schools within the region (Greenway, 2017).

The educational climate significantly impacts students' academic achievement, personal development, and overall well-being (Kutsyuruba et al., 2015). A positive and supportive educational climate nurtures students' engagement, motivation, and sense of belonging (Rania et al., 2014; Ruus et al., 2007). It promotes critical thinking, collaboration, and a love for lifelong

learning. Moreover, a positive educational climate prepares students to become responsible citizens, effective communicators, and adaptable professionals in their chosen fields. It sets the foundation for a lifelong commitment to learning, growth, and success (Greenway, 2017; Mohsena et al., 2016a; Yu et al., 2018).

The educational climate in health science programs plays a pivotal role in shaping various aspects of students' experiences and their future healthcare careers(J. Genn, 2001b). The study delve into how it influences student engagement, learning outcomes, professional identity formation, interprofessional collaboration, student well-being, professionalism, and lifelong learning, and how fostering a positive and supportive climate can benefit both students and patient care (Negash et al., 2022; Ruus et al., 2007).

Student engagement is a cornerstone of effective learning. The educational climate greatly influences the level of student engagement within health science programs(Kassab et al., 2024; Phuntsho & Dendup, 2020). A positive climate, characterized by supportive faculty, interactive teaching methods, and opportunities for active participation, cultivates a sense of enthusiasm and curiosity among students(Kassab et al., 2023). When students feel encouraged to express their ideas, ask questions, and contribute to discussions, their motivation to learn is enhanced. This heightened engagement promotes deeper understanding, critical thinking, and retention of knowledge, leading to improved learning outcomes (Al-Mohaimed, 2013; Zhang et al., 2024).

Learning outcomes are directly influenced by the educational climate(Chan, 2002). A supportive environment that values academic excellence, fosters intellectual curiosity, and provides resources for student success can optimize learning outcomes(Kwong & Davis, 2015). When students feel supported and empowered, they are more likely to invest effort in their studies, seek out additional resources, and excel academically(Wang & Degol, 2016). A positive climate also encourages collaboration among peers, facilitating knowledge-sharing and creating a dynamic learning community that enhances learning outcomes for all (Makhdoom, 2009).

Professional identity formation is an essential aspect of health science education(Poole & Patterson, 2021). The educational climate profoundly impacts how students perceive and develop their professional identities(Sarraf-Yazdi et al., 2021). A climate that promotes professionalism, ethical practice, and patient-centered care sets the stage for students to internalize these values and behaviors. When students witness faculty and mentors modeling professional attitudes and behaviors, they are more likely to emulate them(Rosenblum et al., 2016). This positive climate of professionalism contributes to the development of a strong professional identity, which is crucial

for shaping students into competent and compassionate healthcare professionals (Altemani & Merghani, 2017).

Interprofessional collaboration is increasingly recognized as critical in healthcare (Cleary et al., 2019; Reinke & Hammer, 2011). The educational climate significantly influences the readiness and ability of health science students to collaborate effectively with peers from different disciplines (Karam et al., 2018; Wei et al., 2020). An environment that prioritizes and encourages interprofessional collaboration nurtures mutual respect, facilitates effective communication, and promotes shared decision-making. Through interprofessional learning experiences and collaborative projects, students gain a deeper understanding of the roles and contributions of other healthcare professionals. This prepares them to work collaboratively in interprofessional teams, enhancing patient care and outcomes (Nahar et al., 2010a; Sullivan et al., 2015).

Student well-being is a vital consideration in health science programs (Douwes et al., 2023; Dyrbye et al., 2019a). The educational climate can greatly impact student well-being by providing a supportive and nurturing environment (Pérez-Villalobos et al., 2023). A positive climate recognizes and addresses the challenges and stressors that students may encounter during their education, such as heavy workloads, demanding clinical experiences, and emotional tolls (Dunn et al., 2008). By offering resources for mental health support, academic advising, and work-life balance, health science programs can create an environment that supports student well-being, reducing burnout and promoting overall student success (Mohsena et al., 2016a).

Professionalism is a core competency in healthcare (Huffmyer & Kirk, 2017; Yaqoob Mohammed Al Jabri et al., 2021). The educational climate profoundly influences students' understanding and embodiment of professionalism (West & Shanafelt, 2007). A climate that emphasizes integrity, ethical decision-making, and respect for diversity and inclusion helps students develop a strong ethical framework (Brennan & Monson, 2014). By providing opportunities for ethical case discussions, reflection, and mentorship, health science programs can cultivate a climate that nurtures professionalism. This prepares students to navigate complex ethical dilemmas they may encounter in their healthcare careers, ensuring high-quality and compassionate care for patients (Makhdoom, 2009).

Lifelong learning is essential in healthcare professions due to the ever-evolving nature of medical knowledge and technology (Morgan, 2025). The educational climate greatly influences students' attitudes towards continuous learning and professional development (Arifin et al., 2024). A climate that values and supports ongoing learning fosters a culture of innovation, evidence-based practice, and adaptability to new healthcare advancements (Fisher & Fraser, 1991). By

encouraging students to engage in professional organizations, attend conferences, pursue advanced degrees, and stay current with the latest research and best practices, health science programs foster a commitment to lifelong learning(Matlhaba, 2025). This ensures that healthcare professionals remain competent and up-to-date, ultimately benefiting patient care and outcomes (Mohsena et al., 2016a).

The influence of the educational environment on students' learning and performance can be examined through the perspective of social cognitive learning theory(Bandura, 2001; Nabavi, 2012). This theory offers a comprehensive framework that includes the concept of triadic reciprocal determinism in learning. According to this model, behavior, cognition, personal factors, and environmental influences are all dynamic determinants that interact and mutually influence each other, shaping the learning process(Bandura, 2001).

Assessing the educational climate and its impact on student achievement is essential for program improvement and ensuring the competence of future healthcare professionals. It enables institutions to identify strengths, address weaknesses, enhance teaching and learning strategies, promote student engagement, address barriers to learning, and continuously improve educational programs. By prioritizing assessment in this area, educational institutions can better prepare students for successful careers in healthcare and contribute to overall patient care and safety.

Health science education programs face unique challenges that impact education quality and student preparedness (Organization, 2013). These challenges include keeping up with evolving knowledge and technology, securing adequate clinical training opportunities, promoting interdisciplinary collaboration, meeting accreditation and regulatory requirements, dealing with limited resources, managing the demands of clinical practice, and promoting diversity and inclusion (Ambusaidi & Al-Balushi, 2012). Addressing these challenges requires collaboration among institutions, providers, accrediting bodies, and policymakers (Organization, 2013). It entails ongoing curriculum review, faculty development, investment in resources, fostering teamwork, and inclusivity.

By addressing these challenges, the health education profession is striving to enhance the competency, visibility, marketability, and quality of practitioners. This is being achieved through professional preparation that emphasizes health education, certification through examination, and recertification that requires a specific number of continuing education contact hours(Mail, 1994). Currently, numerous higher education institutions provide health professional education in both public and private setups. This expansion has its advantages and drawbacks for the quality of

health professional education. Health science education programs can better equip students for the dynamic healthcare landscape.

The educational environment significantly influences student learning outcomes, particularly in health science education, where both academic and clinical training environments shape performance, motivation, and professional identity. A growing body of literature in the Ethiopian context has explored how students' perceptions of their educational climate relate to academic achievement, highlighting key institutional, interpersonal, and behavioral factors.

A comparative cross-sectional study focusing on anesthesia students in Ethiopian universities examined how perceptions of the educational environment were associated with academic outcomes. Students who perceived their learning climate as supportive marked by strong teacher-student relationships, peer cooperation, and responsive academic staff tended to perform better academically. The study employed Bandura's Social Cognitive Theory as a conceptual framework, emphasizing the reciprocal interactions among environmental influences, student behavior, and cognitive factors in shaping learning outcomes. The findings reinforce the view that a positive academic environment enhances both student engagement and performance by nurturing self-efficacy and reducing academic stress (Negash et al., 2022).

In another study involving 394 undergraduate medical and health science students, approximately 50% of participants expressed satisfaction with their clinical learning environment (CLE). Satisfaction was significantly correlated with positive perceptions of the curriculum, institutional reputation, and supportive learning structures, which in turn were linked to higher academic performance and greater self-esteem. Based on these findings, the authors recommended a multifaceted intervention approach, including the improvement of learning infrastructure, enhanced collaboration among facilitators, and active inclusion of student feedback in curriculum development, to foster a more conducive academic climate and elevate achievement outcomes (Ayenew et al., 2024).

Complementing these program-specific studies, a systematic literature review by Frontiers in Education (2024) analyzed national trends in academic achievement across Ethiopian higher education institutions between 2005 and 2022. While not limited to health sciences, the review identified socioeconomic status, institutional resourcing, and access to educational support services as overarching determinants of student success. These macro-level findings highlight the structural dimensions of the educational environment, emphasizing the role of policy and system-level interventions in creating equitable learning conditions across disciplines (Kassaw et al., 2024).

In addition, individual-level behavioral and cognitive factors have been found to significantly influence academic performance. A study of health science students across multiple institutions identified time management skills, strategic study habits, test-taking competence, and rural origin as significant predictors of student achievement. Although these variables are not direct measures of the educational climate, they are shaped and reinforced by institutional environments, indicating that the academic climate interacts with and facilitates the development of effective learning behaviors (Hailu et al., 2024).

Taken together, these studies underscore the multidimensional nature of student achievement in Ethiopian health science education. A supportive and well-resourced educational environment, enriched by positive interpersonal relationships and student-centered governance, contributes significantly to both academic success and psychosocial well-being. The literature also suggests that improving student agency, institutional responsiveness, and learning infrastructure is essential to closing achievement gaps and fostering professional competence in Ethiopia's growing health workforce

2.9. Comparative Analysis of Public and Private Health Professionals Education

This section conducts a comparative analysis of health professionals' education in public and private higher education institutions in Ethiopia. It explores the similarities and differences in curriculum design, teaching methodologies, faculty qualifications, resources, and clinical training opportunities between the two sectors. Additionally, it investigates the factors influencing the performance of graduates from public and private institutions on licensure examinations.

Ethiopia is home to both public and private higher education institutions that offer training and education for healthcare professionals. Assessing and understanding the quality of education provided by these institutions is crucial for enhancing the healthcare system in the country.

In recent years, there has been a noticeable growth of private higher education institutions in Ethiopia, particularly in the field of health sciences (Kebede Kassahun, 2012). These institutions have played a significant role in expanding educational access and meeting the growing demand for healthcare professionals in the country.

Public higher education institutions (HEIs) are typically characterized by larger class sizes, more diverse student populations, and a greater reliance on government funding compared to their private counterparts. These institutions often enroll tens of thousands of students, which can lead to less frequent student-faculty interaction and a more anonymous experience for students, potentially impacting retention and graduation rates (Lei, 2016). Their funding structures are

heavily dependent on federal and state sources, and shifts in government support can influence their ability to provide public services and maintain community engagement(Lei, 2016). Public universities tend to offer a broader range of degree programs, including more doctoral and science/technology degrees, and are often tasked with balancing undergraduate education, graduate training, research, and public service(Buckner & Zapp, 2021).The diversity and size of public HEIs present unique challenges in creating supportive learning environments and ensuring student success, but also position them as key drivers of social mobility and economic development(Courant et al., 2006).

Private higher education institutions have emerged as an alternative to address the limited capacity of public universities and colleges in Ethiopia. They have opened doors of opportunity for students who may have faced challenges securing admission in public institutions due to competition or capacity limitations(Damtew, 2005; Kebede Kassahun, 2012).

Private institutions have made significant contributions to the training of healthcare professionals in the field of health sciences, including doctors, nurses, midwives, radiology technologists, pharmacists, medical laboratory technologists and other allied health science field of studies(Cancedda et al., 2018). These institutions have introduced new programs and specialized areas of study that were previously unavailable, thereby expanding the range of options and opportunities available to students (Frenk et al., 2010a; Organization, 2013).

The establishment of private health science institutions has played a crucial role in addressing the shortage of healthcare professionals in Ethiopia. By producing a larger number of graduates in these fields, private institutions have made significant contributions to the overall healthcare workforce in the country(Kebede Kassahun, 2012; Mekasha, 2020).

Moreover, private institutions frequently introduce innovative teaching methods and technologies to the education sector(Basu, 2013). They prioritize practical training, clinical exposure, and research opportunities, recognizing their significance in developing competent and skilled healthcare professionals(Frenk et al., 2010a; Teixeira et al., 2017).

Private higher education institutions (HEIs) are generally characterized by smaller class sizes, which allow for more personalized attention and closer student-faculty interaction compared to public institutions(Basu, 2013; Shah et al., 2013). These institutions often invest in better infrastructure and modern facilities to attract students and remain competitive, with amenities and resources frequently cited as important factors in student choice(Shah et al., 2013). Private HEIs also tend to have greater flexibility in curriculum design, enabling them to quickly adapt programs to meet labor market demands, introduce innovative teaching methods, and offer

specialized or niche degrees particularly in fields like business and technology(Buckner & Zapp, 2021; Teixeira & Amaral, 2001). This adaptability is partly due to their autonomy and less bureaucratic governance structures, which facilitate rapid decision-making and responsiveness to industry trend(Shah et al., 2013; Teixeira & Amaral, 2001).

However, it is important to note that the growth of private higher education institutions in Ethiopia has also posed challenges(Nwuke, 2008; Yirdaw, 2016). Quality assurance and accreditation mechanisms need to be strengthened to ensure that these institutions meet the required standards and produce graduates who are competent and capable of meeting the healthcare needs of the population(Tamrat, 2014; Tamrat & Teferra, 2020).

The growing demand for healthcare professionals globally, driven by aging populations, expanding healthcare systems, technological advancements, interdisciplinary approaches, and global health challenges, has resulted in a rise in health science programs at both public and private higher education institutions(Liu et al., 2017; Yeganeh, 2019). These programs aim to meet the evolving needs of the healthcare industry and equip future professionals with the skills and knowledge necessary to provide high-quality care in an increasingly complex healthcare landscape (Organization, 2013; Pruitt & Epping-Jordan, 2005; Schwartzman, 2002).

Public and private higher education institutions have distinct differences in their educational environments(Abdul et al., 2013; Bidwell & Dreeben, 2003; Geiger, 1988). Public institutions are funded by the government and often have larger enrollments, lower tuition fees, and more diverse student populations. They are subject to government regulations and have a broader range of programs (Hou et al., 2018a). In contrast, private institutions rely on tuition fees and donations, tend to have smaller class sizes, higher tuition fees, and more specialized programs. They have greater autonomy in governance and may offer a unique campus culture. Public institutions often have extensive research facilities, while private institutions may rely more on private funding. Both types of institutions contribute to the higher education landscape (Frenk et al., 2010a; Teixeira et al., 2017).

Research comparing private and public higher education institutions (HEIs) reveals a nuanced picture of their educational environments. Private HEIs often score higher in areas such as student satisfaction, service delivery, and certain aspects of student performance, with studies from Colombia and South Africa showing that private institutions tend to outperform public ones in most areas of standardized assessments and in providing a customer-focused experience for students, likely due to greater investment in teaching resources and responsiveness to student needs(Cayon, 2017). However, public HEIs sometimes excel in academic teaching

quality and overall brand value, particularly in terms of perceived value for money and employability, as seen in studies from Croatia and Brazil(Ostojić, 2021). Overall, while private HEIs frequently offer a more favorable educational environment in terms of student experience and certain performance metrics, public HEIs maintain strengths in academic rigor and societal value, and the differences are shaped by local context, funding structures, and institutional priorities(Kim, 2023; Naidu & Derani, 2016).

Ethiopia is an underdeveloped country in eastern Africa, and its poor economy has resulted in poor health conditions for its people and a weak health education system. Despite recent economic progress, significant work is needed to improve the country's healthcare and education systems(Ambusaidi & Al-Balushi, 2012). Ethiopia faces several challenges in its healthcare system, including a shortage of qualified health professionals, unequal distribution of healthcare facilities, and limited resources(Feysia et al., 2012). To tackle these challenges, both public and private higher education institutions have played a vital role in training healthcare professionals across various disciplines. However, it is essential to evaluate and compare the educational programs and environments offered by these institutions in order to enhance the quality of health professionals' education.

The high cost of educating health professionals poses a significant challenge for public higher education institutions(Zusman, 2005). However, by allowing private investment in this sector, the financial burden on the government can be alleviated, and the number of health profession graduates can increase without additional public investment(Hou et al., 2018b). The extent of private institutions' contribution to the education of health professionals varies globally across countries and regions(Buckner, 2017). In numerous countries, both non-profit and for-profit private education institutions have become a significant component of health-professional education and often demonstrate substantial growth (Frenk et al., 2010a; Herath et al., 2017).

Private higher education institutions have played a significant role in meeting the unmet social demand for higher education by providing access to students who may not meet the admission criteria of public institutions(Basu et al., 2012). This has been particularly beneficial for female students and has also created employment opportunities(Levy, 2012). However, the study findings indicate that private higher education institutions face various problems and challenges in areas such as student admission, quality and relevance of education, policy incentives, and regulatory frameworks when compared to public institutions(Bruçaj, 2014). It is noteworthy that the current system does not treat both public and private providers fairly in terms of student recruitment, quality regulation, and other policy incentives (Nega, 2017).

Based on a study conducted in India, the quality of education is influenced by the investment and motivations of both private and public universities. Private universities, motivated by profit and with access to larger investments, often prioritize the long-term sustainability of the institution. This results in the provision of upgraded materials and technological equipment, leading to a higher quality of education. In contrast, public universities, driven by welfare motives, face limitations in investment and may not be able to provide the same level of upgraded study materials and technological equipment. As a result, private universities generally offer a higher quality of education compared to public universities (Kishan, 2021). A separate study conducted in Malaysia revealed that there were minimal differences between public and private universities. The respondents, who were students, provided almost similar comments or expressed similar preferences for both types of higher education institutions in Malaysia (Naidu et al., 2016).

The growth of private higher education institutions offering health professional education in Ethiopia has raised significant concerns regarding its potential positive and negative impacts on broader goals (Kebede Kassahun, 2012). The contrasting motivations of private and public universities influence the approaches used to provide quality health professional education. This includes aspects such as the upgrading of study materials, teaching techniques, and other miscellaneous factors. Although public and private universities share similar objectives, the varying motivations result in differences in the quality of education they provide (Casani et al., 2014; Psacharopoulos, 2004). Studies have indicated disparities in the educational environment and learning outcomes between public and private higher education institutions in Ethiopia (Zwanikken, (2017)). Private institutions generally possess greater resources and flexibility to adapt to changes in the educational environment, whereas public institutions may face constraints due to bureaucratic processes and limited resources (Levin, 1999).

Several comparative studies have investigated the disparities in educational practices and outcomes between public and private higher education institutions, particularly in the context of health professionals' education. These studies have highlighted variations in curriculum design, teaching methodologies, and faculty qualifications, among other factors.

For example, when examining the educational environments of public and private medical schools, it has been observed that private institutions often maintain smaller class sizes, possess more extensive resources, and foster greater faculty-student interaction. In contrast, public institutions may have a larger student body and rely on government funding, which can impact resource allocation and faculty-to-student ratios (Dyrbye et al., 2019b).

Comparative analyses of public and private health professional education in Ethiopia offer important insights into the perceived and actual differences in graduate competence, institutional quality, and service delivery outcomes. Though limited in scope, available studies reveal nuanced patterns of convergence and divergence between these sectors.

A notable study conducted in Addis Ababa assessed the perceptions of employers and patients regarding graduates from private higher education institutions (PHEIs) and public universities, as well as their experiences with private versus public health services (Bonger, 2011). The findings indicated that approximately two-thirds of employers viewed graduates from both sectors as equally competent, while 26% considered private graduates superior and 12% perceived them as less competent. Interestingly, patients expressed a strong preference for private health service delivery, with 82% reporting better overall care compared to services provided in public facilities. These results suggest that although educational outputs may be perceived as comparable in terms of graduate competence, the quality of service delivery and patient experience tend to favor the private sector, possibly due to factors such as responsiveness, infrastructure, and provider-patient communication(Bonger, 2011).

Despite the need for more comprehensive comparisons, existing studies highlight gaps in student preparedness and professionalism across educational backgrounds. For instance, a comparative analysis in anatomy education found that students who had completed their high school education in public institutions consistently outperformed their peers from private schools. Specifically, graduates from private high schools were 3.22 times more likely to perform poorly in anatomy compared to those from public-sector schools (Bekel et al., 2019). This performance gap points to underlying variability in pre-university academic preparation, which has implications for the quality of entrants into health science programs, particularly in private higher education institutions that may not enforce stringent admission criteria.

Further disparities in graduate quality are evident in a survey conducted among practicing nurses in Hawassa, which compared the professional conduct and competencies of graduates from public and private colleges. The study found that graduates from public institutions exhibited 1.5 times higher levels of professionalism than those trained in private colleges. This discrepancy was largely attributed to differences in institutional infrastructure, faculty expertise, and practical training opportunities, with public colleges generally benefiting from better resourcing, regulatory oversight, and access to teaching hospitals (Abebe Boe et al., 2024).

Additionally, another study investigated the curriculum design and assessment practices in public and private medical schools, revealing noteworthy findings. Private institutions were found to

offer greater flexibility in their curriculum, enabling students to pursue individual interests and engage in experiential learning. On the other hand, public institutions typically adopt more standardized curricula that align with national licensing requirements (Teixeira et al., 2017).

Collectively, these studies suggest that while employers may perceive parity in graduate competence, actual disparities in academic preparation, clinical exposure, and professional behavior persist between the two sectors. Public institutions appear to have an advantage in terms of training quality and professional readiness, likely due to more established systems, better-equipped facilities, and alignment with national academic standards. Conversely, private institutions though often seen as more responsive and patient-centered in-service delivery may face challenges related to faculty recruitment, curriculum rigor, and clinical practice integration.

These findings highlight the importance of standardizing quality assurance mechanisms and strengthening academic and clinical partnerships across both public and private institutions. They also underscore the need for ongoing comparative research to inform policy development, institutional accreditation, and resource allocation aimed at improving the overall quality and equity of health professional education in Ethiopia.

2.10. Conclusion

The literature review concludes by synthesizing the key insights derived from a comparative analysis of health professionals' education in public and private higher education institutions (HEIs) in Ethiopia. This synthesis emphasizes the critical role of evidence-based policymaking, inter-institutional collaboration, and the continuous evaluation of the educational environment in enhancing the quality of training programs and ensuring the development of competent, ethical, and practice-ready healthcare professionals. The review highlights that the educational environment comprising physical infrastructure, pedagogical strategies, institutional culture, and student support systems plays a decisive role in shaping students' academic performance and professional development. It particularly influences outcomes such as licensure examination performance, which serves as a benchmark for assessing readiness to enter clinical practice.

Through the application of the Dundee Ready Education Environment Measure (DREEM) tool, the review reveals notable differences between public and private HEIs. Private institutions often report more favorable learning environments, potentially due to better resource allocation, smaller class sizes, and more personalized student support. However, public institutions offer their own advantages, such as broader access, stronger links with public health systems, and

often more experienced faculty. These variations underscore the need for targeted interventions and reforms that acknowledge the contextual strengths and limitations of each sector.

Importantly, the review underscores that improving the educational environment across all HEIs is not only a matter of institutional policy but also a national imperative for strengthening Ethiopia's healthcare system. Quality health professionals' education serves as a foundational pillar in addressing the country's healthcare workforce challenges, particularly in meeting population health needs and achieving universal health coverage goals. Therefore, sustained investment in research, capacity-building, and stakeholder engagement including government bodies, regulatory agencies, academic institutions, and professional associations is essential.

In conclusion, the findings of this literature review call for a strategic and coordinated approach to health professions education reform. By addressing disparities between public and private institutions and fostering a conducive learning environment for all students, Ethiopia can enhance the competency of its health workforce, thereby contributing to improved health outcomes and the broader goals of national development

Chapter Three: Methodology

3.1. Introduction

This chapter provides a detailed account of the methodological framework employed in the study. It begins by exploring the philosophical assumptions underpinning the research, including the epistemological and ontological perspectives that inform the study's overall approach. It then outlines how the key concepts and variables identified in the theoretical framework are operationalized for empirical investigation. Following this, the chapter discusses the research design, providing justification for the chosen approach in alignment with the study objectives.

The methods section presents a comprehensive explanation of the procedures used, including the study area, eligibility criteria for participant selection, data sources, and sampling strategies. It also details the identification and classification of study variables, as well as the instruments and procedures used for data collection. Particular attention is given to the Dundee Ready Education Environment Measure (DREEM), including its scoring system and interpretation. The chapter also describes the data analysis techniques employed, incorporating both descriptive and inferential statistics, and outlines measures for data quality management to ensure validity and reliability. Ethical considerations, such as informed consent, confidentiality, and institutional approvals, are also addressed.

Finally, the chapter introduces the concept of Tertium Comparationis, which serves as the conceptual basis for conducting a systematic comparison between public and private health science education institutions. This ensures that the comparative analysis is grounded in common dimensions such as educational environment, student satisfaction, and academic achievement.

3.2. Philosophical Assumptions

This study was guided by the philosophical assumptions of pragmatism, which supports the integration of both quantitative and qualitative research methods. Pragmatism provides the philosophical underpinning for the mixed-methods research approach, offering a flexible and solution-oriented framework that integrates both quantitative and qualitative methodologies (Creswell & Clark, 2007). Unlike positivism, which emphasizes objective measurement and statistical analysis, or interpretivism, which focuses on understanding subjective experiences and social contexts, pragmatism prioritizes practical inquiry and the utility of research outcomes (Biesta, 2021). It supports the use of diverse methods, arguing that no single approach holds a monopoly on truth. Instead, pragmatism maintains that the nature of reality is dynamic and multifaceted, and thus, understanding complex phenomena often requires drawing from both numerical data and contextual, experiential insights (Creswell & Clark, 2007).

This philosophy allows researchers to choose methods based on the specific demands of the research question rather than being constrained by a single epistemological stance. In this way, pragmatism strengthens the rationale for mixed-methods research by endorsing methodological pluralism and emphasizing the importance of actionable, context-sensitive knowledge (Yvonne Feilzer, 2010). Pragmatists view reality as dynamic and evolving, and believe that knowledge is best constructed through a continuous process of inquiry that adapts to the context and needs of the problem at hand (Morgan, 2014). This approach is particularly valuable in fields like social work, healthcare, and organizational research, where complex issues often require flexible, context-sensitive methodologies (Allemang et al., 2022). Pragmatism also encourages researchers to focus on the consequences of their findings and to prioritize solutions that have real-world impact, making it especially relevant for research aimed at informing policy or practice (Hannes & Lockwood, 2011).

Pragmatism emphasizes the potential for compatibility between quantitative and qualitative research, as well as between positivism and interpretivism. As a result, the mixed-methods approach embraces a wide-ranging perspective, drawing from multiple sources to create a comprehensive and versatile research methodology (Creswell & Poth, 2016). By employing a mixed-methods approach, this study benefits from the triangulation, corroboration, and complementation of results, thereby enhancing the validity of inferences. This approach allows for a more robust understanding of complex phenomena by integrating and synergizing different sets of findings (Mertens, 2007). For this study pragmatism is an ideal paradigm because it allows for:

- A combination of quantitative and qualitative methods to evaluate the educational environment.
- A flexible research design that accommodates multiple sources of data.
- A problem-solving approach that aims to generate actionable recommendations for improving health professional education.

Pragmatism emphasizes practical problem-solving and the use of multiple forms of data to address complex research questions. By adopting a pragmatic stance, the study prioritizes the research objective and the context in which it is situated, allowing for methodological flexibility and the use of tools that best generate meaningful and actionable insights. This philosophical orientation aligns well with the mixed-methods approach employed in the study, enabling a comprehensive understanding of the research problem through the combination of numerical trends and contextual interpretations. Health professional education is a complex phenomenon

and touches multi-faceted dimensions including educational teaching-learning, students' performance, quality of education, political, administrative, economic, and socio-cultural aspects. To address the issues related to health professional educational environment and its impact on students' achievement mixed research approach will be important. For this study, pragmatism is an essential philosophical stance because the complexity of the Ethiopian health professions education crisis cannot be adequately understood through a single methodological lens. Quantitative indicators such as licensure examination results and Dundee Ready Education Environment Measure (DREEM) scores provide critical evidence on students' academic performance and perceptions of the educational environment, allowing for systematic comparison across institutions and programs. However, while these measures identify patterns, trends, and areas of concern, they do not fully explain the underlying institutional, pedagogical, and contextual factors shaping these outcomes. Conversely, qualitative data derived from students' and educators' narratives offer in-depth insights into lived experiences and institutional realities but lack generalizability when used in isolation. Pragmatism therefore supports the integration of quantitative and qualitative approaches, enabling a comprehensive, context-sensitive, and practice-oriented understanding of health professions education challenges and informing actionable, evidence-based improvements.

3.3. Research Design

A comparative cross-sectional study research design was used, combining the strengths of a cross-sectional approach, which collected data from different groups at a single point in time, with the detailed contextual analysis typical of case studies (Creswell & Creswell, 2017; Patton, 2014; Xu et al., 2024). This design enabled comparison across multiple institutional contexts or groups while capturing unique case-specific factors. A mixed-methods approach with a convergent parallel strategy was employed, allowing simultaneous collection and analysis of quantitative data for cross-group comparisons and qualitative data for in-depth insights (Demir & Pismek, 2018). The integrated data enhanced validity and provided comprehensive understanding, resulting in a robust and practically relevant assessment of educational environments and student outcomes across settings (Creswell & Creswell, 2017; Johnson & Christensen, 2019).

Utilizing a combination of quantitative and qualitative methods proves advantageous in gaining a comprehensive and in-depth comprehension of a complex phenomenon. By leveraging the strengths of both approaches and compensating for their respective limitations, a mixed-method approach facilitates a more comprehensive depiction and thorough explanation of the phenomenon under investigation. This approach enables the inclusion of multiple perspectives,

resulting in a richer understanding of the subject matter (Creswell, 2014). By incorporating qualitative and quantitative methods and facilitating a blend of exploratory and explanatory research, this study aims to address a broad range of questions concerning "why," "how," "what," and "who." This design involves merging or converging both qualitative and quantitative data to provide a comprehensive analysis of the research problem.

In the Convergent parallel design, the researcher typically collects data of both types concurrently and integrates the information during the interpretation of the overall results. Any contradictions or incongruent findings that arise in this design was carefully examined and further investigated to gain a deeper understanding of the research findings (Creswell, 2014; Demir & Pismek, 2018). Given the objective of this study, which is to obtain a comprehensive understanding and detailed description of the status and practices of the health professional educational environment, as well as its impact on students' achievement in Ethiopian Higher Education Institutions (HEIs), a mixed-methods approach incorporating both interpretive and positivist paradigms was deemed most suitable.

A comparative cross-sectional study design was employed to compare public and private higher education institutions (HEIs). This design is appropriate because it allows for the simultaneous collection of data from both types of institutions at a single point in time, enabling a direct comparison of their educational environments and student achievement levels.

- Cross-sectional design: This approach is efficient for gathering data quickly and is particularly useful for identifying patterns or differences between groups (public vs. private HEIs).
- Comparative element: The study will explicitly compare the two types of institutions to identify similarities, differences, and potential areas for improvement.

This design is suitable for addressing the research objectives, as it provides a snapshot of the current state of the educational environment and student achievement in both public and private HEIs.

This study used a mixed method parallel design, in which both quantitative and qualitative data were collected concurrently and analyzed independently. The quantitative component involved the use of the DREEM (Dundee Ready Education Environment Measure) questionnaire to numerically assess students' perceptions of the educational environment, along with the analysis of students' academic achievement, including licensure examination results. The qualitative component included interviews and open-ended survey questions to explore students, instructors and stakeholders lived experiences and gain deeper insights into the learning context. Finally, the

findings from both strands were integrated during the interpretation phase to provide a comprehensive understanding of the educational environment and its influence on student performance and outcomes.

3.4. Study Area

This study was conducted in selected higher education institutions in Ethiopia that are currently engaged in providing undergraduate health science education programs.

3.5. Study Population

The study population was consisted of undergraduate health science students and faculty members from selected public and private HEIs offering health professionals' education programs.

- Students: They are the primary stakeholders in the educational environment, and their perceptions, as measured by the DREEM tool, was provide insights into the quality of the learning environment. And also, their licensure exam result.
- Faculty members and stakeholders: Their perspectives were complemented student data, offering a more comprehensive understanding of institutional strengths and weaknesses.

The inclusion of both students and faculty ensures a balanced and holistic assessment of the educational environment and students' performance.

3.6. Eligibility Criteria

The study was included all undergraduate students enrolled in Medicine, Nursing, Midwifery, and Radiologic Technology programs who are in their final year of study during the 2024/2025 academic year at Addis Ababa University (AAU), Hawassa University (HU), Rift Valley University, and Africa Medical College. These four institutions were selected from a pool of 21 higher education institutions (HEIs) in Ethiopia that offer at least two or more undergraduate health science programs selected and eligible for the national licensure examination administered by the Ethiopian Ministry of Health. This selection criterion ensures institutional diversity while maintaining relevance to the study's objective of comparing educational environments and licensure performance across accredited programs.

Final-year students were specifically selected for this study because they are at the culmination of their academic training and are best positioned to provide informed and reflective insights into the educational environment they have experienced throughout their studies. Additionally, final-year students are eligible to sit for the national licensure examination, making them the appropriate population for linking perceptions of the educational environment with objective

performance outcomes. Their inclusion ensures both relevance and validity in evaluating the relationship between educational climate and licensure performance.

Only students from academic programs that are included in the licensure examination from the first to the tenth round, as administered by the Ministry of Health, was considered in the analysis. This criterion ensures consistency and comparability in assessing student performance and the educational environment across the selected institutions.

3.7. Data Sources and Sampling

The primary data sources for this study were Ethiopian higher education institutions (HEIs) currently engaged in offering undergraduate health professional education programs. These included both public and private institutions, reflecting the diversity of the higher education landscape in Ethiopia. To ensure representativeness, reduce selection bias, and enable valid comparisons across institutional types, a stratified multistage random sampling technique was employed. According to Creswell and Kothari (Creswell & Creswell, 2017; Kothari, 2004), stratified sampling is appropriate when the population can be meaningfully divided into subgroups that differ on key characteristics in this case, institutional ownership (public versus private). In the first stage, the population of HEIs was stratified into two strata: public and private institutions. This stratification was necessary to account for potential structural, administrative, and pedagogical differences that could influence educational environments and student outcomes. In the second stage, random sampling was applied within each stratum to select institutions proportionally, ensuring that both categories were adequately represented.

The sampling frame comprised twelve public and nine private HEIs, each offering a minimum of two undergraduate health science programs that are subject to the National Licensure Examination administered by the Ethiopian Ministry of Health. To further enhance representativeness and reduce selection bias, a third stage of random sampling was implemented at the program level. In this stage, academic programs (fields of study) were randomly selected from nine nationally recognized health science disciplines that have consistently participated in the national licensure examination from its introduction through the tenth examination round. This criterion ensured continuity, data completeness, and comparability across licensure cohorts. As a result of the random selection process, the Medicine, Nursing, Midwifery, and Radiologic Technology programs were included in the study, providing representation across core clinical and allied health professions. This stratified multistage random sampling approach ensured balanced inclusion of institutions and disciplines, improved the generalizability of findings, and allowed for meaningful comparative analysis between public and private HEIs. Such an

approach is consistent with best practices in educational research, where multiple stages of randomization help to minimize bias and increase external validity (Etikan & Bala, 2017).

Sample size: The sample was consisted of all final-year students from the selected programs, as they are best positioned to reflect on their educational experiences and are eligible for the licensure examination, which serves as an objective measure of academic achievement. In addition, for the qualitative component of the study, faculty members and academic leaders were purposively selected from each chosen institution and field of study. Specifically, three faculty members and one program coordinator or department head from each selected program were included, with eligibility limited to those having a minimum of two years of teaching or academic leadership experience. This criterion ensured that participants possessed adequate familiarity with the academic environment, curricular implementation, and instructional practices. Their inclusion was intended to generate in-depth insights into the educational environment, teaching quality, and institutional challenges. In total, 48 participants were recruited for the qualitative study.

Inclusion criteria: The inclusion was the enrollment in the final year of an undergraduate health science program, while faculty participants must have a minimum of two years of teaching experience in the relevant disciplines.

Exclusion criteria: Students and faculty from institutions that do not offer recognized health science programs or who decline participation was excluded from the study.

This approach enhances the representativeness of the sample, minimizes selection bias, and allows for comparative analysis across different types of institutions and programs. Additionally, key informants, including academic leaders, administrators and policymakers, was purposively selected to provide in-depth information on the structure, challenges, and development of health professional education in Ethiopia.

3.8. Study Variables

Dependent variables

The study considered two dependent variables: students' perception of their educational environment, evaluated using the DREEM tool, and their academic achievement, assessed through multiple indicators such as perceived performance, Cumulative Grade Point Average (CGPA), and performance on national licensure exam.

Independent variables

The independent variables considered in this study include various socio-demographic factors. These factors encompass the student's age, gender, religion and residency (whether they come from a rural or urban area). In addition to socio-demographic variables, institution-related factors and factors affecting educational environment are also taken into account. These factors include the student's entrance exam grade from their 12th-grade education, their chosen department or field of study, and the specific institution or study site they are enrolled in. These independent variables provide a comprehensive framework for examining the potential influences on the dependent variables of students' perception of their educational environment and their academic achievement.

3.9. Procedures and Instruments of Data Collection

This study utilized both primary and secondary sources to address the research objectives. A combination of survey methods and documentary analysis was employed to gather the necessary data. Primary data were collected through self-administered questionnaires distributed via Google Forms and through semi-structured interviews, while secondary data were obtained from academic records and relevant policy documents.

Primary Data Collection Procedures:

Data collection was conducted using Google Forms, which enabled efficient and standardized administration of the questionnaire across all participating institutions. A scheduled distribution date was established to ensure consistency in timing across sites. The questionnaire included a demographic section that gathered information such as age, gender, university entrance examination results, and the student's chosen field of study.

Three primary data collection instruments were used:

1. DREEM Questionnaire (Dundee Ready Education Environment Measure):

- The DREEM is a validated and widely used instrument designed to assess the educational environment in health professions education (Roff et al., 1997a).
- It consists of 50 items organized into five domains:
 1. Students' Perception of Learning (12 items)
 2. Students' Perception of Teachers (11 items)
 3. Students' Academic Self-Perception (6 items)
 4. Students' Perception of Atmosphere (11 items)

5. Students' Social Self-Perception (10 items)

- Each item was rated on a 5-point Likert scale (0 = strongly disagree to 4 = strongly agree), with higher scores reflecting a more positive perception of the educational environment.

2. Academic Records:

- Academic performance data were collected to objectively assess student achievement. These included:
 - Cumulative Grade Point Average (GPA)
- Results of the national licensure examination collected from FMOH
- These indicators provided standardized measures of student outcomes across institutions and disciplines.

3. Semi-Structured Interviews

- Semi-structured interviews were conducted with a purposive sample of final-year students and faculty members.
- The interviews explored:
 - Perceived strengths and weaknesses of the educational environment
 - Challenges encountered during academic training and clinical practice
 - Suggestions for improving the quality and relevance of health professional education in Ethiopia

Secondary Data Collection:

Document analysis involved the systematic review of relevant national and international documents, including policy statements, proclamations, guidelines, technical reports, statistical abstracts, books, and credible digital sources. These documents provided contextual insights into the governance, quality assurance, and curriculum structure of health professional education in Ethiopia.

The results of the national licensure examination were obtained from the Federal Ministry of Health (FMOH) following an official request letter by the center of international comparative education and policy studies. This formal process ensured authorized access to the examination data for use in the study, adhering to institutional protocols and maintaining data integrity. The collected data provided essential outcome measures for the research analysis.

Pilot Testing:

To ensure reliability and validity, a pilot test was conducted with approximately 10% of the total sample size at one site separate from the main data collection site to avoid information dissemination. The pilot assessed the clarity and effectiveness of the questionnaire items in capturing the intended constructs. Based on participant feedback and data quality review, minor revisions were made to improve the instrument's clarity and functionality within the Google Forms platform.

3.10. Data Analysis Techniques

In this study, both quantitative and qualitative data analysis methods were employed to comprehensively address the research objectives. The questionnaire data were coded, entered, cleaned, and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Quantitative data with complete responses were initially entered into EpiData version 4.20 and then exported to SPSS for further analysis. The distribution of variables was assessed for normality using histograms, skewness, outlier detection, the Shapiro-Wilk test, and Levene's test for equality of variances.

Descriptive statistics, including means, medians, standard deviations, and frequency distributions, were used to summarize the DREEM scores and academic performance. Inferential statistics such as independent sample t-tests, correlation analyses, bivariate, and multivariable linear regressions were conducted to examine the relationships between perceptions of the educational environment, and academic achievement. Group comparisons particularly between public and private higher education institutions (HEIs) were made using t-tests and regression analysis. A p-value of less than 0.05 at a 95% confidence interval was considered statistically significant. Results were presented using tables and narrative descriptions, with group comparisons summarized using mean $\pm$ standard deviation (SD) for DREEM scores and academic performance.

Qualitative data were audio-recorded, transcribed verbatim, and imported into ATLAS.ti version 9 for systematic management and analysis. The data were analyzed using a hybrid deductive-inductive thematic analysis approach. Initially, a deductive coding framework was developed based on the study's conceptual framework and primary research questions to ensure alignment with the study objectives. Subsequently, inductive coding was applied to allow new patterns, meanings, and context-specific issues to emerge directly from the data. Codes were iteratively

reviewed, compared, and refined, and closely related codes were grouped into categories. These categories were then synthesized into higher-order themes following the principles of reflexive thematic analysis. This approach enabled both theoretical guidance and analytical flexibility, supporting a comprehensive and contextually grounded interpretation of participants' experiences and perceptions.

Qualitative findings were used to contextualize and complement the quantitative results, providing a deeper understanding of the educational environment and informing actionable recommendations for improvement.

Integration of Findings (Pragmatic Approach)

In line with the pragmatic paradigm that guided this mixed-methods study, the integration of findings was carried out through systematic triangulation. This involved combining quantitative data specifically the DREEM scores and academic performance results with qualitative insights obtained from in-depth interviews. Triangulation was used not only to validate the findings by cross-verifying evidence from multiple sources but also to enrich the interpretation by capturing both measurable patterns and contextual understanding. This integrative process ensured that the conclusions drawn were robust, credible, and grounded in both statistical trends and lived experiences.

Furthermore, the integrated analysis informed action-oriented recommendations aimed at improving the quality of health professional education in Ethiopia. These recommendations were derived from the convergence of empirical evidence and participant narratives. Quantitative data highlighted patterns and disparities in the educational environment and academic outcomes, while qualitative data provided explanatory depth regarding the underlying institutional and systemic challenges. Together, these findings were used to propose practical, evidence-based strategies such as enhancing faculty development programs, strengthening student support systems, and addressing infrastructural and curricular gaps that are both feasible and responsive to the contextual realities of health science education.

3.11. Data Quality Management

To ensure high data quality and methodological rigor, comprehensive training sessions were conducted for all data collectors and supervisors before the study commenced. These sessions covered ethical considerations, detailed guidance on the study objectives, and step-by-step procedures for administering and managing data collection using digital tools. Additionally, the research instrument was carefully adapted to the study context and its reliability was tested through a pilot study, which helped identify and address any issues with clarity and consistency. This piloting process enhanced the instrument's validity and ensured it was appropriate for the target population, thereby strengthening the overall quality and trustworthiness of the data collected.

A pretest of the questionnaire was conducted at Menelik II Health Science College using a sample of final-year radiology technology students who were not included in the main study. The pretest aimed to assess the clarity, reliability, and contextual appropriateness of the data collection tool. Based on feedback from the pretest participants, minor revisions were made to improve item comprehension and questionnaire structure.

The final data collection was carried out through a Google Form-based self-administered questionnaire, which was distributed electronically and completed by participants across all selected institutions on the same specified date and time. This digital approach facilitated uniform administration and improved data handling efficiency.

To assess the reliability of the DREEM instrument, Cronbach's alpha was calculated based on the pretest responses. The reliability coefficient obtained was 0.80, indicating good internal consistency and confirming the tool's appropriateness for assessing perceptions of the educational environment.

Table 2: Reliability Statistics

Cronbach's Alpha	N of Items
0.800	50

Supervisors monitored the data collection process remotely and performed continuous checks for completeness, clarity, and consistency. Automated controls in the Google Form helped minimize missing responses and formatting errors. After data collection, responses were exported from Google Forms and entered into EpiData version 4.20 for additional validation before being transferred to SPSS version 25 for detailed statistical analysis.

Validity of the study instruments was ensured through the use of the DREEM tool, which is internationally recognized and validated for evaluating educational environments in health professions education. Academic achievement data were obtained from official institutional records (MoH), providing an objective and standardized measure to complement self-reported perceptions

3.12. Ethical Consideration

Data for this study were collected through a structured questionnaire administered via Google Forms, following ethical approval from the Institutional Review Board (IRB) of the College of Education and Behavioral Sciences at Addis Ababa University (Approval Number: CEBS_IRC_CCEPS_002/2024; Approval Date: November 1, 2024). The target population consisted of undergraduate health science students enrolled in selected public and private universities and medical colleges across Ethiopia. Prior to participation, students were briefed on the study's objectives, scope, and their rights as participants.

Verbal informed consent was obtained from each student before they were granted access to the online survey platform. To ensure accountability and ethical compliance, the verbal consent process was conducted in the presence of a faculty member who acted as an impartial witness and confirmed each participant's voluntary agreement to participate. Following verbal consent, participants were presented with a digital written consent form at the beginning of the online survey. This form clearly outlined the study's purpose, confidentiality safeguards, and the voluntary nature of participation. Students who agreed to participate clicked "Yes" to proceed; those who selected "No" were automatically restricted from accessing the remainder of the questionnaire.

The data collection period extended from March 1, 2024, to January 30, 2025. To preserve anonymity and minimize social desirability or acquiescence bias, no personally identifiable information such as names, contact details, was collected. Instead, each participant was assigned a unique code, allowing for data management and analysis without compromising confidentiality. The survey was fully anonymized, and the research team had no mechanism to trace individual responses during or after data collection. In addition to survey responses, licensure examination results were obtained from the Ministry of Health through an official request letter submitted by the center for comparative education and policy studies, ensuring the legitimacy and accuracy of data. These procedures ensured ethical rigor, participant autonomy, and the integrity of the data obtained.

To ensure the rigor and credibility of the qualitative study, this research adhered to the Standards for Reporting Qualitative Research (SRQR), which provide comprehensive guidelines to enhance transparency and methodological quality in qualitative research reporting (O'Brien et al., 2014). Following SRQR ensured systematic documentation of key elements including research design, data collection, analysis procedures, researcher reflexivity, ethical considerations, and techniques used to enhance trustworthiness. Adherence to these standards strengthens the validity and reliability of the study findings and facilitates clearer communication of the research process and outcomes to the scientific community (O'Brien et al., 2014).

3.13. Tertium Comparationis: Basis for Comparison

In comparative research, particularly when analyzing institutional differences across sectors, it is essential to establish a neutral and objective basis for comparison that transcends simple dichotomies of public versus private ownership. In this dissertation, a tertium comparationis approach is employed to systematically analyze and interpret the similarities and differences between public and private higher education institutions (HEIs) offering health professionals' education in Ethiopia.

The *tertium comparationis* for this study is defined as:

The quality and effectiveness of educational processes and outcomes in preparing competent health professionals capable of responding to Ethiopia's evolving healthcare system needs.

This shared axis of comparison allows for a balanced assessment of both sectors by focusing on common educational goals rather than institutional ownership structures alone. Both public and private HEIs ultimately seek to graduate competent, ethical, and clinically proficient health professionals who are equipped to serve the country's population health needs.

The study operationalizes this tertium comparationis across multiple interrelated domains:

Table 3: Tertium Comparationis

Dimension	Indicators	Relevance to Study
Curriculum Design and Relevance	Alignment with national competency frameworks; Integration of theory and clinical practice; Responsiveness to healthcare demands	Ensures that both sectors deliver curricula that prepare students for licensure exams and real-world practice.
Faculty Capacity and Teaching Quality	Availability of qualified full-time instructors; Pedagogical competencies; Faculty development opportunities	Assesses teaching staff qualifications and effectiveness in both public and private settings.
Student Learning Experience	Academic support systems; Clinical exposure; Mentorship and supervision	Evaluates students' ability to learn, practice, and develop clinical competence.
Educational Resources and Infrastructure	Learning materials, labs, simulation facilities; Access to clinical sites; Institutional investment	Measures the physical and technological resources necessary for high-quality health education.
Institutional Governance and Quality Assurance	Leadership effectiveness; Internal supervision; Accreditation compliance	Examines institutional accountability, academic standards, and regulatory oversight.
Graduate Competence and Licensure Performance	Licensure examination scores; Clinical readiness; Employer satisfaction	Directly links educational environment to graduate competence and national workforce needs.
Policy and Systemic Support	National policy alignment; Stakeholder involvement; Postgraduate opportunities	Captures broader systemic factors that shape institutional functioning and graduate career pathways.

This framework is especially relevant for Ethiopia's context for several reasons:

- Both public and private HEIs operate under the same national regulatory frameworks established by bodies such as the Ministry of Education, Education and training Authority, the Ministry of Health, and professional councils.
- The ultimate goal for both sectors is to produce health professionals who meet national competency standards and contribute to strengthening Ethiopia's health system.
- Using this tertium comparationis allows for an in-depth and nuanced comparison that moves beyond simplistic judgments of sector superiority, instead focusing on educational processes, resource allocation, and graduate outcomes.
- It facilitates the identification of shared challenges and sector-specific gaps that require targeted policy interventions.

Throughout this dissertation, this tertium comparationis guides both the quantitative and qualitative analyses. The DREEM scores, licensure exam results, regression analysis, and thematic interview findings are all interpreted through the lens of how each institutional type supports or hinders the development of competent health professionals. This approach allows for meaningful policy-relevant conclusions that can inform improvements across both sectors.

Chapter Four: Result

4.1. Demographic Characteristics

Out of a total sample of 626 undergraduate students invited to participate in the survey questioner, 492 students fully completed and submitted the questionnaire, resulting in a robust response rate of 78.59%. Among the respondents, 255 were male (51.82%) and 237 were female (48.18%), indicating a nearly balanced gender distribution that contributes to the gender representativeness of the sample. Regarding institutional affiliation, 248 respondents (50.41%) were enrolled in public higher education institutions, while 244 respondents (49.59%) were from private institutions. This near-equal representation across both gender and institution type strengthens the diversity of the sample and enhances the potential for meaningful comparative analyses. Such distribution allows for an informed examination of differences and similarities in students' perceptions and academic outcomes between public and private universities, thereby enriching the study's validity and applicability to varied educational contexts.

Table 4: Gender and Institution distribution

Count				
		Institution Type		Total
		Public	Private	
Gender	Female	150	87	237
	Male	98	157	255
Total		248	244	492

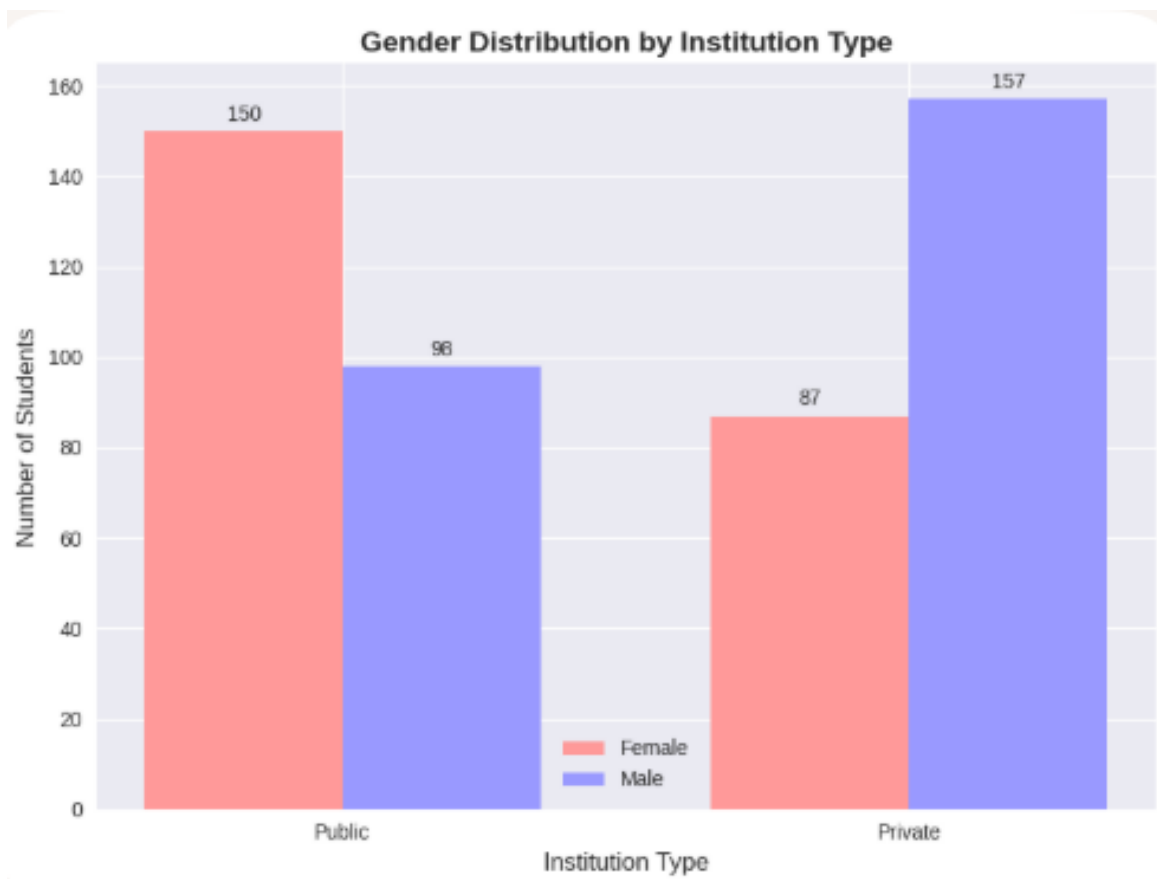


Figure 2: Gender distribution by institutional type

4.2. Comparative Assessment of Educational Environment in Public and Private HEIs

Analysis of the Dundee Ready Education Environment Measure (DREEM) inventory, completed by 492 student respondents, produced an overall mean score of 138 out of a possible 200, suggesting a generally positive perception of the educational environment. When disaggregated by institutional type, students enrolled in public higher education institutions (HEIs) reported a higher mean DREEM score (141.6/200) compared to their counterparts in private HEIs (134.6/200). This observed difference indicates comparatively more favorable perceptions of the learning environment within public institutions, particularly in relation to teaching, academic atmosphere, and institutional support. Based on the established DREEM interpretive guidelines developed by Roff et al. (1997), this score falls within the category of "more positive than negative," indicating that students generally held a favorable perception of their educational environment (Roff et al., 1997a). This overall rating reflects a learning atmosphere that is supportive and conducive to academic development, suggesting that many key elements of a positive educational climate such as effective teaching, respectful faculty-student relationships, and academic self-perception are present within the institutions surveyed.

However, despite this generally positive appraisal, the score also suggests room for further improvement, particularly in areas that did not reach the optimal threshold of 151-200, which is interpreted as an "excellent educational environment." The findings imply that while students perceive their academic environment to be constructive, certain domains potentially related to perceptions of teaching quality, learning strategies, adequate academic support, or the social environment may require targeted interventions and continuous quality enhancement.

Thus, the results highlight not only the strengths of the current educational setting but also the need for ongoing assessment and refinement. Enhancing weaker domains can contribute to improved student satisfaction, better academic performance, and greater psychological well-being, ultimately leading to the production of more competent and confident health professionals.

Table 5: Total Mean Score of DREEM

Institution Type		Mean of Students Perception of Learning	Mean of Students Perception of Teachers	Mean of Students Academic Perception	Mean of Students Perception of Atmosphere	Mean of Students Social Self Perception	DREEM total Mean score
Private	Mean	2.5478	2.6728	2.6421	2.6025	2.7553	2.6441
	N	244	244	244	244	244	244
	Std. Deviation	.53644	.40785	.64067	.40894	.35949	.37590
Public	Mean	2.7597	2.7497	2.7944	2.6862	2.9194	2.7819
	N	248	248	248	248	248	248
	Std. Deviation	.66247	.58169	.61126	.59361	.47898	.52285
Total	Mean	2.6546	2.7116	2.7188	2.6447	2.8380	2.7135
	N	492	492	492	492	492	492
	Std. Deviation	.61192	.50400	.63001	.51165	.43140	.46066

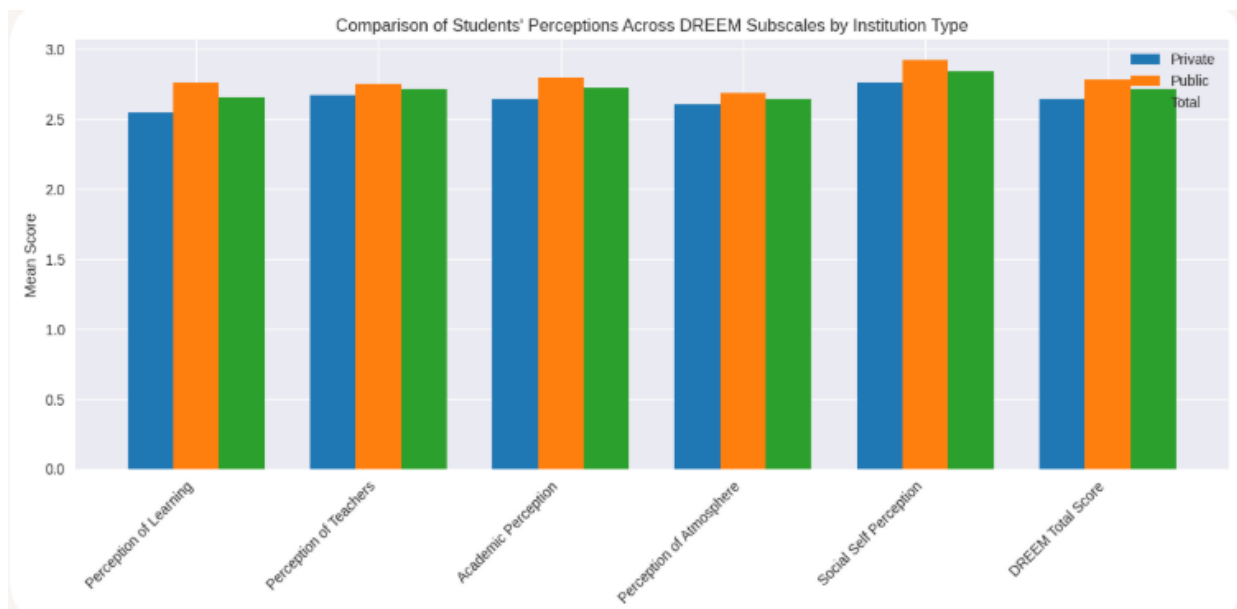


Figure3: comparison of students' perception across DREEM subscales by institution

Students enrolled in public higher education institutions reported consistently higher average scores across all five DREEM subscales as well as the overall educational environment score, when compared to their counterparts attending private institutions. This pattern suggests that students in public universities tend to perceive their educational environments more positively. For example, in the Student Perception of Learning (SPL) subscale, students from public institutions reported a mean score of 2.75 (SD = 0.66), whereas students from private institutions reported a lower mean of 2.54 (SD = 0.53). This significance difference implies that learners in public settings may experience more engaging or effective learning processes, or perceive instructional practices more favorably.

The trend of higher mean scores among public university students was consistent across all other DREEM subscales, including Student Perceptions of Teachers (SPT), Academic Self-Perception (ASP), Perception of Atmosphere (SPA), and Social Self-Perception (SSP), reinforcing the presence of a broader and more favorable view of the academic environment in public institutions.

When considering the overall assessment of the educational environment, public university students achieved a mean total score of 2.78 (SD = 0.52), compared to a mean score of 2.64 (SD = 0.38) among private university students. These higher mean values suggest that various factors commonly associated with public institutions such as greater availability of academic resources,

more experienced faculty, structured support systems, and possibly a more established institutional culture may contribute to enhanced student satisfaction and perceptions of quality. The observed disparities highlight the critical role of institutional context in shaping students' academic experiences and underscore the importance of strategic improvements in private institutions.

Table 6: Total Sum Score of DREEM

Institution Type		Sum of Students Perception of Learning (max - 48)	Sum of Students Perception of Teachers (max - 44)	Sum of Students Academic Perception (max - 24)	Sum of Students Perception of Atmosphere (max - 44)	Sum of Students Social Self Perception (max - 40)	DREEM total Sum score
Private	Mean	30.5738	32.0738	15.8525	28.6270	27.5533	134.6803
	N	244	244	244	244	244	244
	Std. Deviation	6.43731	4.89422	3.84402	4.49831	3.59487	18.63567
Public	Mean	33.1169	32.9960	16.7661	29.5484	29.1935	141.6210
	N	248	248	248	248	248	248
	Std. Deviation	7.94964	6.98031	3.66758	6.52973	4.78980	26.84084
Total	Mean	31.8557	32.5386	16.3130	29.0915	28.3801	138.1789
	N	492	492	492	492	492	492
	Std. Deviation	7.34303	6.04805	3.78005	5.62814	4.31403	23.37432

Students from public higher education institutions reported higher mean scores across all five subscales of the educational environment assessment compared to students from private institutions. Specifically, public university students scored higher on:

- **Student Perception of Learning (SPL):** 33.11 vs. 30.57 (out of 48)
- **Student Perception of Teachers (SPT):** 32.99 vs. 32.07 (out of 44)
- **Students' Academic Self-Perception (SAP):** 16.76 vs. 15.85 (out of 24)
- **Students' Perception of Atmosphere (SPA):** 29.54 vs. 28.62 (out of 44)
- **Students' Social Self-Perceptions (SSP):** 29.19 vs. 27.55 (out of 40)

These results indicate that public university students generally had more positive perceptions of their learning environment than their private university counterparts

Table 7: Student Perception of Learning

Institution		I am encouraged to participate in the class	The teaching is sufficient to my confidence	The teaching encourages me to be an active learner	The teaching focuses on well stimulating	The teaching is good use	The teaching is put to good use	The learning is emphasized over the short term	The teaching is adequate skill labs (demonstration) practice sessions	I am clear about the assessment procedure of the courses	I am getting adequate exposure for clinical skills expected of me		
Private	Mean	3.19	2.26	2.30	2.63	2.55	2.16	2.77	2.01	2.51	2.63	2.75	2.82
	Std. Deviation	.488	1.131	1.105	.824	.823	1.098	.824	.977	.979	1.004	.846	.774
Public	Mean	3.08	2.76	2.54	2.94	3.10	2.55	3.11	2.48	2.78	2.35	2.71	2.71
	Std. Deviation	.591	1.075	.947	1.115	.934	1.196	1.047	.854	1.042	1.194	.765	.755
Total	Mean	3.14	2.51	2.42	2.79	2.83	2.36	2.94	2.25	2.65	2.49	2.73	2.77
	Std. Deviation	.545	1.130	1.035	.993	.922	1.164	.958	.946	1.020	1.112	.806	.765

The Student Perception of Learning (SPoL) subscale, which consists of 12 items designed to evaluate students' views on the quality and effectiveness of the learning process, yielded an overall mean score of 31.85 out of a maximum possible 48. According to DREEM interpretive guidelines, this score indicates a generally positive perception of the learning environment among respondents. Students expressed a favorable view of how learning is facilitated within their academic programs, suggesting that instructional strategies and learning interactions were largely supportive and engaging. When disaggregated by institutional type, notable differences emerged. Students from public higher education institutions reported a mean SPoL score of 33.11, while those from private institutions reported a lower mean score of 30.57. This disparity suggests that students in public universities perceive their learning experiences more positively, potentially due to more effective pedagogical approaches, better-trained faculty, more robust academic infrastructure, or greater curricular coherence. The higher SPoL scores in public institutions may also reflect institutional maturity and greater alignment with evidence-based teaching practices.

Analysis of individual items within the SPoL subscale revealed further insights. One of the highest-rated items across both institutional types was the statement indicating that educators actively encourage student participation in the classroom. This response suggests that interactive and learner-centered teaching practices are valued and experienced by students in both public and private settings, reflecting positively on classroom engagement and faculty-student interaction. In contrast, one of the lowest-rated items was the perception that long-term learning is prioritized over short-term performance goals. This suggests a shared concern among students that current teaching approaches may be too narrowly focused on exam preparation, memorization, or immediate assessment outcomes, rather than cultivating deep understanding and the ability to apply knowledge in diverse, real-world contexts. This finding highlights an important area for pedagogical improvement: the need to design curricula and teaching methods that emphasize conceptual mastery, critical thinking, and long-term retention, which are essential for preparing competent health professionals.

Overall, these results emphasize the importance of continuous efforts to enhance teaching quality and curriculum alignment particularly in private institutions to ensure that learning environments are not only perceived positively but also foster sustainable academic growth and professional development.

Table 8: Student Perception of Teachers

Institution Type		The school has adequate and qualified instructors	The teachers are good at providing feedback to students	The teachers have good communication skills with patients	The teachers are knowledgeable	The teachers give clear examples	The teachers are well prepared for their classes	The teachers provide constructive criticism here	Teachers inspire the students	The teachers get angry in the classroom/practical site	The teachers are authoritarian	Teachers have adequate skill in clinical skill teaching
Public	Mean	2.94	2.80	2.83	3.16	3.09	3.04	2.68	2.62	1.71	1.94	3.17
	Std. Deviation	.770	.808	.895	.545	.508	.583	.834	.701	.986	.839	.508
Private	Mean	2.91	3.05	2.32	3.11	2.97	2.92	2.46	2.77	2.16	2.35	3.23
	Std. Deviation	1.043	.857	1.335	.501	.504	.647	.885	.886	1.171	1.089	.655
Total	Mean	2.92	2.93	2.57	3.13	3.03	2.98	2.57	2.70	1.93	2.15	3.20
	Std. Deviation	.917	.841	1.165	.523	.510	.618	.867	.803	1.105	.994	.587

The Student Perception of Teachers (SPT) subscale, which evaluates students' views on faculty behavior, teaching effectiveness, and interpersonal interactions, revealed meaningful insights into instructional quality across institutional types. Among students enrolled in public higher education institutions, the SPT subscale yielded a mean score of 32.99 out of a maximum possible 44, while students from private institutions reported a slightly lower mean of 32.07 out of 44. Both scores fall within the interpretive range characterized as “moving in the right direction”, suggesting that students across both sectors generally hold positive perceptions of their instructors and recognize efforts toward improving teaching quality. Importantly, the difference in mean scores between public and private institutions was not statistically significant, indicating that, on the whole, students from both types of institutions had comparable views of their teaching faculty. This finding suggests a level of consistency in perceived teaching quality across Ethiopia’s public and private health science education sectors.

Across both groups, several items within the SPT subscale were highly rated, reflecting strengths in faculty expertise and preparedness. Students consistently perceived their instructors as knowledgeable in their subject matter, well-prepared for classroom and clinical sessions, and competent in delivering clinical instruction a particularly critical area in health sciences education. These high ratings underscore the commitment of teaching staff in both sectors to uphold professional and pedagogical standards. However, the subscale also revealed areas of concern. Notably, some students reported that teachers occasionally exhibited authoritarian behaviors and, at times, expressed anger during instructional sessions. Such behaviors can create a tense or intimidating learning environment and may undermine students' sense of safety, engagement, and openness in the classroom. These findings point to the need for faculty development initiatives aimed at promoting respectful, inclusive, and emotionally supportive teaching practices. Although overall perceptions were similar, students from public institutions rated their teachers more favorably on several specific items. These included the academic qualifications and adequacy of teaching staff, clarity in teaching through examples, ability to communicate effectively with patients, and the provision of constructive criticism. These strengths may reflect more structured hiring practices, greater faculty development opportunities, or broader institutional support mechanisms present in public universities.

Conversely, students from private institutions rated the item “teachers are good at providing feedback to students” more highly, indicating a potential area of strength in student-centered feedback and formative assessment practices in private settings. This nuanced difference suggests that while public institutions may excel in certain areas of faculty expertise, private institutions might be placing greater emphasis on individualized feedback and learner support.

Overall, the findings highlight the complex and multifaceted nature of teaching quality in higher education. They emphasize the importance of continuous faculty development that targets not only subject matter expertise but also communication skills, emotional intelligence, and pedagogical techniques.

Table 9: Students' Academic Self-Perception

Institution Type		Much of what I have to learn seems relevant to a career in my profession	I feel I am being well-prepared for my profession	My problem-solving skills are being well-developed here	I am confident about passing exit/licensure exam	I have learned a lot about empathy in my profession	I am comfortable with the learning strategies being used
Private	Mean	3.02	2.64	2.54	2.75	3.11	1.79
	Std. Deviation	.625	.827	.716	.757	.544	1.464
Public	Mean	3.04	2.90	2.69	2.76	3.20	2.17
	Std. Deviation	.638	.899	.609	.717	.659	1.272
Total	Mean	3.03	2.77	2.61	2.76	3.15	1.98
	Std. Deviation	.631	.873	.667	.736	.606	1.383

The Students' Academic Self-Perception (SAP) subscale, which assesses learners' confidence in their academic abilities, self-efficacy, and readiness for professional responsibilities, revealed meaningful trends across both public and private higher education institutions. Students from public institutions reported a mean score of 16.76 out of a maximum of 24, while those from private institutions reported a slightly lower mean score of 15.85. Both scores fall within the DREEM interpretive category of "feeling more on the positive side," indicating a moderately positive academic self-perception among the overall student population. The relatively higher score among students from public universities suggests a more favorable academic self-image, potentially reflecting differences in curriculum structure, faculty mentorship, access to learning resources, or assessment methods. Students in public institutions may feel better equipped to handle academic demands and more confident in their preparedness for future professional roles.

Across both institutional types, students expressed strong agreement with positively framed items, particularly those emphasizing the relevance of academic learning to their future careers. For example, many respondents indicated that they had gained meaningful insights into empathy and humanistic care, and they recognized the long-term professional value of the knowledge acquired through their education. This alignment between academic content and career aspirations is especially important in health and social science fields, where emotional intelligence, compassion, and communication are critical components of professional competence. However, despite the generally positive perception of academic relevance, the SAP subscale also revealed areas of concern, particularly in relation to learning strategies and cognitive development. Students across both public and private institutions expressed lower levels of confidence in their ability to use effective learning strategies and reported uncertainty about the development of their problem-solving skills. Many indicated discomfort with the learning approaches used in their programs and questioned whether their education was sufficiently promoting independent, critical, and reflective thinking.

These responses point to underlying pedagogical challenges and suggest that while students may find the content of their courses meaningful, they may not always feel empowered to engage with it actively or apply it analytically. This disconnect can hinder the development of academic autonomy and limit students' ability to transfer theoretical knowledge into practical problem-solving in clinical or professional settings. To address these concerns, institutions particularly private ones, where the SAP scores were lower should consider reviewing and strengthening their instructional methodologies. Integrating student-centered teaching approaches, such as problem-based learning (PBL), case-based instruction, and formative feedback mechanisms, could foster greater self-efficacy and promote the acquisition of critical thinking and problem-

solving competencies. Moreover, providing targeted support services such as academic advising, study skills workshops, and mentorship programs may enhance students' confidence in navigating academic challenges. In summary, while the SAP subscale findings reveal an encouraging trend toward positive academic self-perception, they also underscore the need for deliberate pedagogical enhancements aimed at cultivating students' cognitive skills and academic independence key attributes for success in health science education and professional practice.

Table 10: Students' Perception of Atmosphere

Institution Type		The school has good teaching-learning facilities (Library, ICT room, classroom, internet and other)	The practice areas are conducive for learning	There are opportunities for me to develop interpersonal skills	I feel able to ask the questions I want to ask	The atmosphere here motivates me as a learner	I am comfortable concentrating for my education	The atmosphere is relaxed during the practical siting	This school is well timed	Cheating is a problem in this school	I find the experience disappointing	Unfair grade is a problem in this school
Public	Mean	2.80	2.86	2.96	3.07	2.88	2.98	2.48	2.24	2.10	1.88	2.25
	Standard Deviation	.753	.778	.702	.548	.671	.488	.767	1.019	1.004	.908	1.286
Private	Mean	2.49	2.84	2.94	3.06	2.84	2.94	2.51	2.48	1.87	2.10	1.79
	Standard Deviation	.918	1.081	.855	.653	1.025	.437	.830	1.256	1.374	1.253	1.040

Total	Mean	2.64	2.85	3.00	3.06	2.86	2.98	2.50	2.36	2.03	1.99	2.82
	Standard Deviation	.853	.943	.783	.602	.867	.464	.798	1.150	1.226	1.100	1.179

The Students' Perception of Atmosphere (SPA) subscale, which evaluates students' views on the general academic climate, including the psychological and physical environment of the learning setting, yielded important findings in the present study. Students from public higher education institutions reported a mean score of 29.54 out of a possible 44, while those from private institutions had a slightly lower mean score of 28.62. Both scores fall within the DREEM interpretive category of "more positive than negative attitude," suggesting that, overall, students across both types of institutions hold moderately favorable perceptions of their educational atmosphere. The marginally higher mean score among public university students indicates a relatively more positive perception of the academic environment, which may reflect differences in institutional culture, availability of learning resources, or the organization of academic services. While no individual item within the SPA subscale emerged as a definitive area of strength, students from public institutions consistently reported more favorable experiences across several important dimensions of the learning atmosphere compared to their private institution counterparts.

In particular, students in public universities rated higher on items related to the adequacy of teaching and learning infrastructure, including library services, access to information and communication technology (ICT) facilities, classroom space and quality, internet connectivity, and other core academic resources. These ratings suggest that students in public institutions may benefit from better-resourced physical and technological learning environments, which can play a significant role in shaping overall satisfaction and engagement. In addition to infrastructure, public university students also reported greater satisfaction with the conduciveness of clinical or practical areas for learning, as well as with the organization and perceived fairness of class schedules and examination timetables. These factors contribute significantly to students' academic well-being, reducing stress and promoting a more structured and predictable learning experience.

Despite the generally positive outlook, a notable area of concern identified by students across both institutional types was the issue of unfair grading practices. Although this item was rated somewhat more positively by students in public universities, the concern was still prevalent enough in both groups to warrant attention. Perceptions of inconsistency or lack of transparency in assessment procedures can negatively affect students' trust in the academic system and diminish motivation. These findings underscore the importance of continuously improving the educational atmosphere, particularly by addressing systemic challenges that may hinder student satisfaction. For both public and private institutions, there is a clear need to enhance transparency and fairness in grading, improve academic resource accessibility, and ensure that the learning environment is both physically and psychologically supportive. This includes strengthening communication between faculty and students, promoting respectful interactions, and ensuring that institutional policies related to teaching, assessment, and support services are implemented consistently and fairly. In conclusion, while the SPA subscale results indicate a moderately positive perception of the educational atmosphere, the findings also point to critical areas for strategic improvement.

Table 11: Students' Social Self-Perceptions

Institution Type		I have good friends in the school	There is a good support system for students who get stressed	I am enjoying this program	I am bored on the courses	I get support from other practitioners in the practice sites	My accommodation is pleasant	My interpersonal communication is smooth	My social life is good	I occasionally feel lonely	I receive the necessary clinical supervision
Private	Mean	3.60	1.48	2.89	2.26	2.94	2.82	2.92	3.10	2.71	1.70
	Std. Deviation	.582	1.341	.677	.700	.537	.791	.511	.512	.866	.701
Public	Mean	3.76	2.06	3.24	2.49	2.94	2.90	2.95	3.29	2.87	2.22
	Std. Deviation	.465	1.521	.876	.714	.580	.534	.567	.535	.973	.815
Total	Mean	3.68	1.77	3.07	2.38	2.94	2.86	2.94	3.19	2.79	2.76
	Std. Deviation	.532	1.461	.802	.716	.558	.674	.540	.531	.924	.762

The Students' Social Self-Perceptions (SSP) subscale, which explores students' feelings of social integration, emotional well-being, and the availability of peer and institutional support, revealed important insights into the social dimension of the educational environment. Students attending public higher education institutions reported a mean score of 29.19 out of a possible 40, while those from private institutions scored slightly lower, with a mean of 27.55. According to DREEM interpretive guidelines, both scores fall within the range described as "not too bad," suggesting that students, overall, hold moderately positive perceptions of their social experiences during their education, although important challenges remain. The slightly higher mean score among public university students suggests that they experience a more favorable social climate, potentially due to more extensive peer networks, extracurricular opportunities, or better-established institutional support systems. While the scores are not alarmingly low, they indicate that students' social well-being is an area in need of ongoing attention and targeted improvement, particularly in private institutions where perceptions were comparatively less positive.

Despite the need for improvement, several items within the SSP subscale received consistently high ratings across both institutional types, reflecting strengths in peer relationships and general social satisfaction. For example, students commonly expressed agreement with statements such as *"I have good friends in this school"* and *"My social life is good."* These responses highlight the value of peer interactions in shaping students' overall experience and suggest that many students benefit from supportive friendships and a positive sense of community within their academic environments. However, the subscale also revealed notable areas of concern, particularly regarding institutional support structures and clinical supervision. Students from both public and private institutions, and particularly those from private institutions, assigned lower ratings to items such as *"There is a good support system for students who get stressed"* and *"I receive the necessary clinical supervision."* These items point to perceived deficiencies in psychological support services and academic oversight, both of which are critical to student well-being and professional development especially in the demanding context of health science education. The lower ratings among private institution students may reflect disparities in the availability of trained mental health professionals, inadequate support infrastructure, or insufficiently staffed clinical training sites. Lack of access to timely support and effective clinical supervision can negatively impact students' emotional resilience, reduce motivation, and hinder the development of essential clinical competencies

4.3. Comparative Analysis of Student Achievement in Public vs. Private HEIs

The analysis of licensure examination results revealed that the overall average (mean) score among health science graduates across both public and private higher education institutions (HEIs) was 48.98. This result indicates that, on average, students scored below the 50% threshold, suggesting a generally suboptimal level of performance on this high-stakes assessment.

This mean score reflects the combined performance of graduates from diverse programs such as nursing, midwifery, medicine, and radiology technology, across multiple institutions. Considering that licensure examinations are designed to assess the minimum competency required for professional practice, an average score below 50% raises concerns regarding the adequacy of educational preparation, curriculum alignment, and teaching effectiveness in health professional education programs.

From a statistical standpoint, a mean score below 50% implies that more than half of the examinees failed to achieve a basic passing standard, assuming the passing mark is set at or above 50%. This underperformance may reflect systemic challenges such as: Inadequate clinical training opportunities, Insufficient alignment between curriculum and licensure content, Limited instructional resources, or Variations in assessment and feedback practices.

Furthermore, this result necessitates closer examination of institutional factors, such as differences between public and private HEIs, to understand whether certain environments are more conducive to preparing students for licensure success.

Table 12: Distribution of students Licensure exam Result

	N	Minimum	Maximum	Mean	Std. Deviation
Students Licensure Exam Result	492	20.30	87.70	48.9884	13.24821
Valid N (listwise)	492				

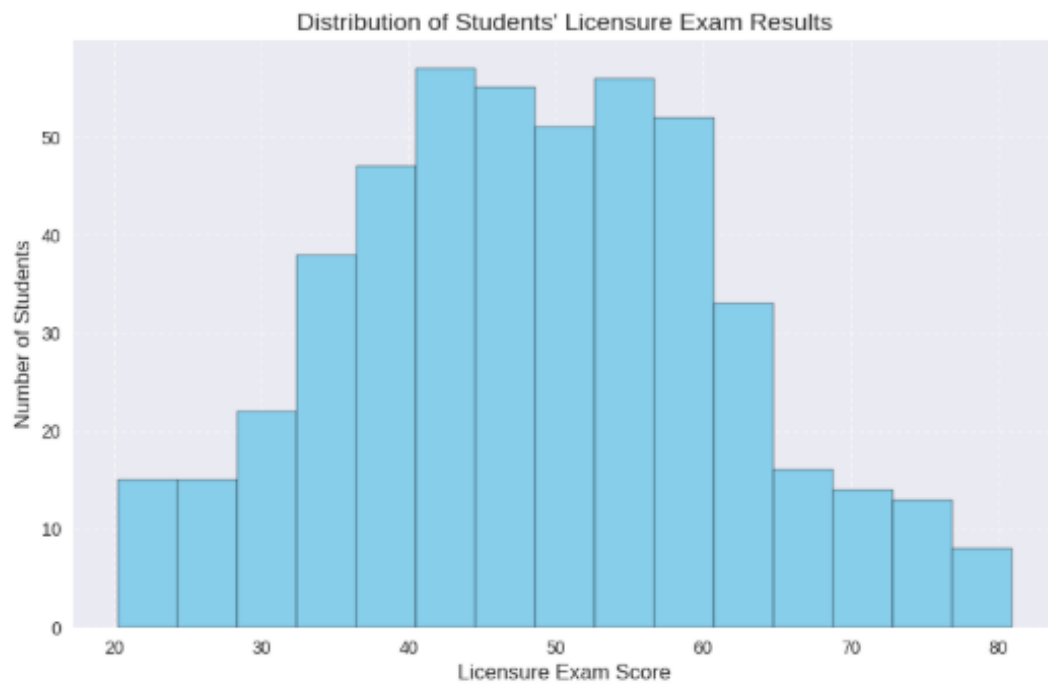


Figure 4: Distribution of students' licensure exam result

Table 13: Comparative Statistics of students Licensure exam result by institution type

		Institution Type		Statistic	Std. Error
Students Licensure Exam Result	Public	Mean		53.5324	.83503
		95% Confidence Interval for Mean	Lower Bound	51.8876	
			Upper Bound	55.1772	
		5% Trimmed Mean		53.3718	
		Median		51.2500	
		Variance		170.135	
		Std. Deviation		13.04358	
		Minimum		20.60	
		Maximum		87.70	
		Range		67.10	
		Interquartile Range		14.92	
		Skewness		.420	.156
		Kurtosis		.194	.310
	Private	Mean		44.5177	.75417
		95% Confidence Interval for Mean	Lower Bound	43.0323	
			Upper Bound	46.0032	
		5% Trimmed Mean		44.0938	
		Median		44.3000	
		Variance		141.054	
		Std. Deviation		11.87662	
		Minimum		20.30	
		Maximum		86.50	
		Range		66.20	
		Interquartile Range		16.05	
		Skewness		.586	.155
		Kurtosis		.779	.308

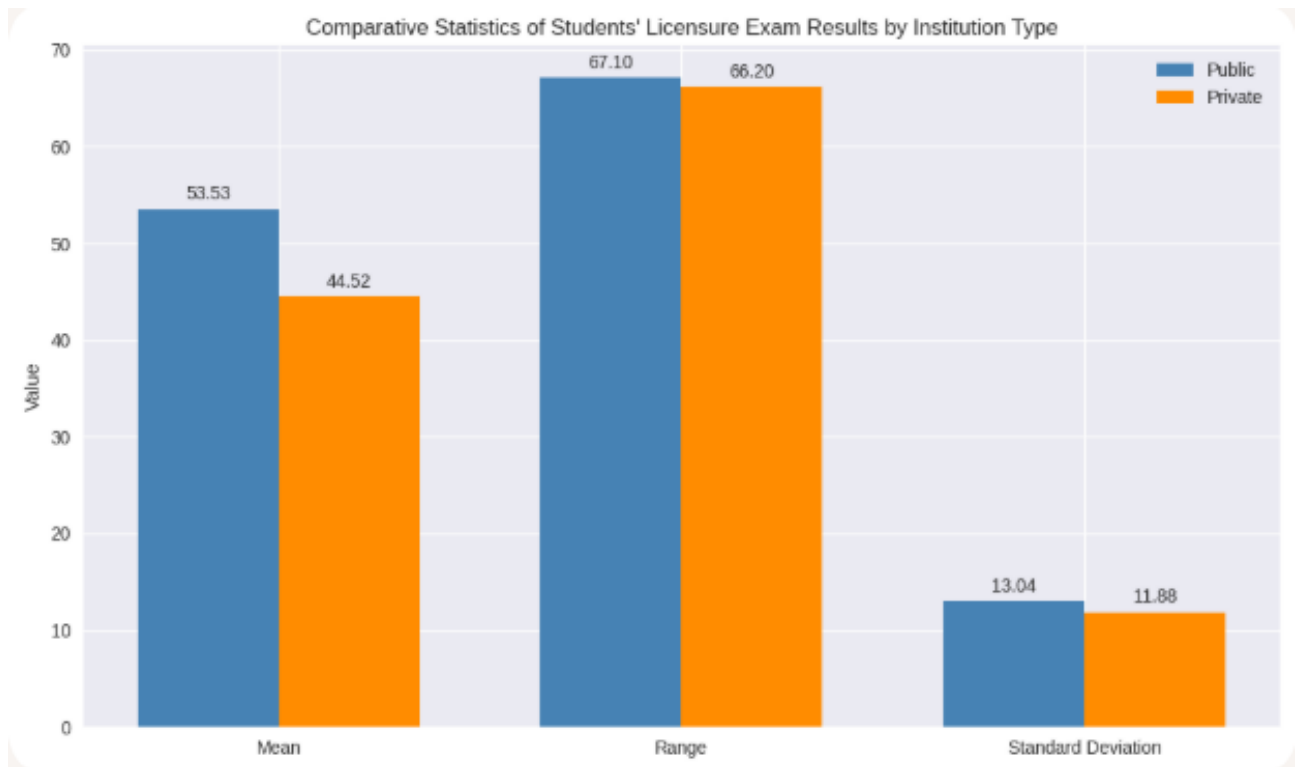


Figure 5: Comparative Statistics of students Licensure exam result by institution type

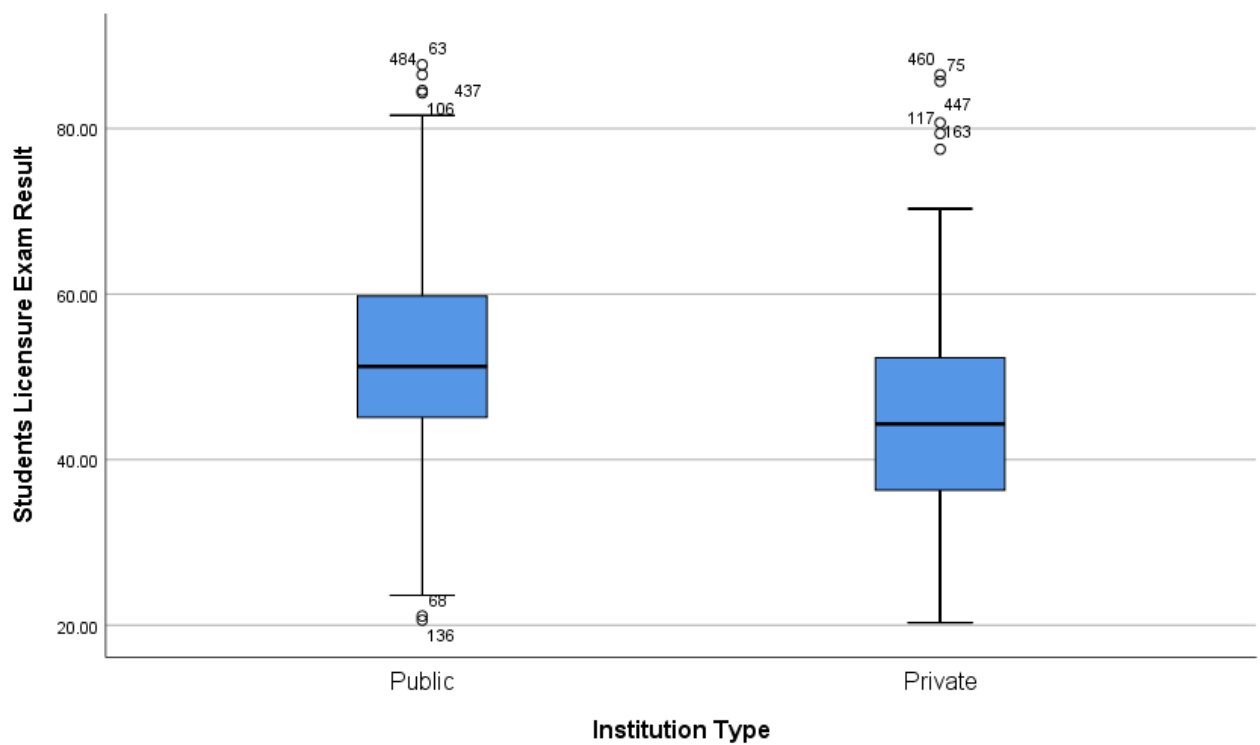


Figure 6: Comparative Statistics of students Licensure exam result

The analysis compared the licensure exam results of health science students graduating from public and private higher education institutions (HEIs). The findings reveal notable differences in central tendency and distributional characteristics between the two groups. Students from public HEIs achieved a higher mean licensure exam score ($M = 53.53$, $SE = 0.84$) than those from private HEIs ($M = 44.52$, $SE = 0.75$). The 95% confidence interval for public institution scores ranged from 51.89 to 55.18, while that for private institution scores ranged from 43.03 to 46.00. Since these intervals do not overlap, this suggests a statistically significant difference between the two groups. The median scores were 51.25 (public) and 44.30 (private), closely aligning with the means. The 5% trimmed means (which reduce the influence of extreme outliers) were also similar: 53.37 for public and 44.09 for private institutions, further confirming the central trend. The standard deviation was slightly higher in public HEIs ($SD = 13.04$) than in private HEIs ($SD = 11.88$), indicating slightly more variability among public HEI graduates. The range of scores was similar: 67.1 for public and 66.2 for private institutions. Although public HEI graduates scored higher on average, score variability was present in both groups, suggesting a wide spread of individual performance levels. Skewness was positive for both groups (0.420 for public, 0.586 for private), indicating that in both cases, the distribution was slightly right-skewed more students scored below the mean, with a few higher outliers. Kurtosis values (0.194 for public, 0.779 for private) were close to 0, suggesting distributions approaching normality but slightly more peaked in private HEIs. The exam score distributions in both groups are approximately normal but with slight right skew. This supports the use of parametric tests for comparing means, with some caution due to mild non-normality.

4.4. Relationship Between Educational Environment and Student Achievement

4.4.1. Correlation and Regression Analysis

The findings of this study reveal a strong and statistically significant correlation between the educational environment and students' licensure examination performance. A Pearson product moment correlation was computed to examine the relationship between the educational environment and students' licensure examination performance. The overall analysis revealed a strong, positive, and statistically significant correlation between the two variables, $r(492) = 0.582, p < .001$. This finding indicates that higher DREEM scores were linearly associated with higher licensure examination scores among health science students across both public and private higher education institutions. Descriptive results showed that the mean DREEM score was 138.58 ($SD = 19.72$), and the mean licensure examination score was 48.98 ($SD = 13.24$). The 95% confidence interval for the correlation coefficient ranged from 0.531 to 0.628, indicating a precise estimate of the true population parameter. Preliminary assumption testing confirmed that the data satisfied the conditions of normality, linearity, and homoscedasticity, and no significant outliers were identified.

To further explore the relationship by institutional type, correlation analyses were conducted for public and private institutions. Among students in public institutions, the correlation between the educational environment and licensure examination performance was $r(248) = 0.601, p < .001$, representing a strong and statistically significant association. For students in private institutions, the correlation was $r(244) = 0.544, p < .001$, also statistically significant and positive. Although both coefficients indicate a strong relationship, the magnitude of the correlation was slightly higher among students from public institutions. Table 14 presents the correlation coefficients for the total sample and by institutional type, along with descriptive statistics for each group.

Table 14: Comparison of mean and standard deviation of the DREEM total sum score and Students Licensure Exam Result

Descriptive Statistics			
	Mean	Std. Deviation	N
DREEM total Sum score	138.5854	19.72259	492
Students Licensure Exam Result	48.9884	13.24821	492

Table 15: Correlation between the educational environment and students' licensure examination performance

		DREEM total Sum score	Students Licensure Exam Result
DREEM total Sum score	Pearson Correlation	1	.582**
	Sig. (2-tailed)		.000
	N	492	492
Students Licensure Exam Result	Pearson Correlation	.582**	1
	Sig. (2-tailed)	.000	
	N	492	492
**. Correlation is significant at the 0.01 level (2-tailed).			

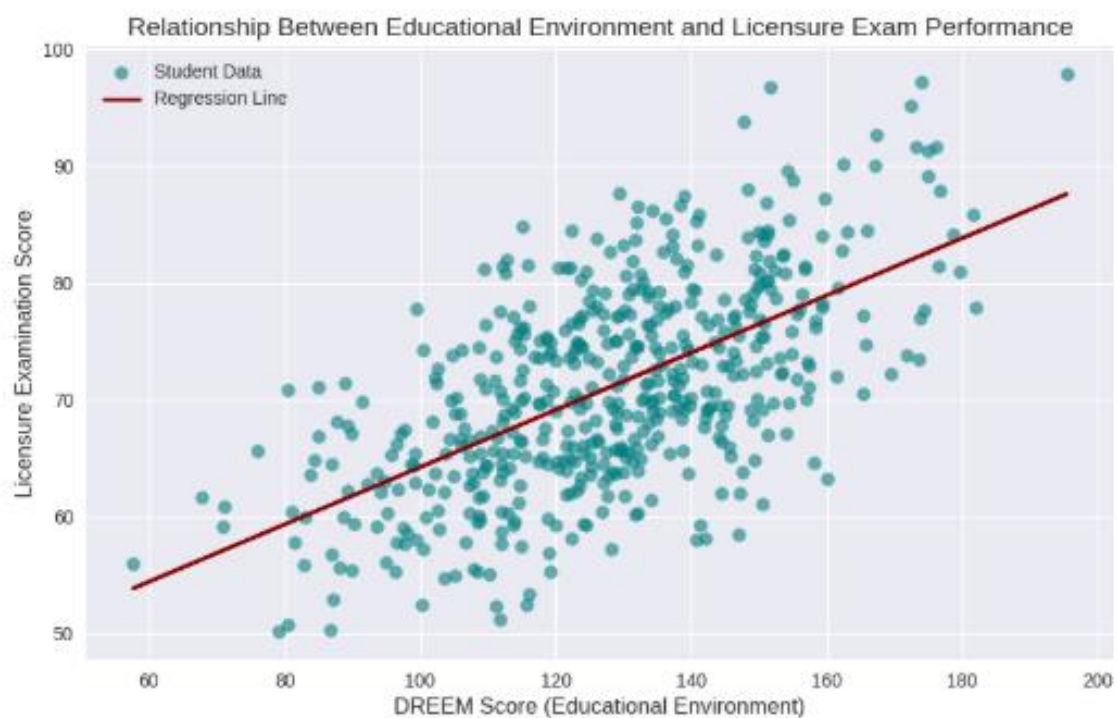


Figure 7: Relationship between DREEM scores and licensure examination performance

4.4.2. Regression Analysis

To examine the predictive relationship between students' perceptions of their educational environment and their licensure examination performance, a multiple linear regression analysis was conducted, incorporating the DREEM total score and institution type as independent variables. A multiple linear regression analysis was conducted to examine the predictive relationship between students' perceptions of their educational environment and their licensure examination performance. The Dundee Ready Education Environment Measure (DREEM) total score and institution type (public vs. private) were entered as independent variables, with licensure examination score serving as the dependent variable.

The overall regression model was statistically significant, $F(2, 461) = 171.245, p < .001$, indicating that the combined predictors reliably explained variance in licensure examination performance. The multiple correlation coefficient was $R = 0.642$, demonstrating a strong positive relationship between the predicted and observed licensure scores. The coefficient of determination ($R^2 = 0.412$) indicated that approximately 41.2% of the variance in licensure examination performance could be explained by students' perceptions of the educational environment and institutional type. After adjusting for the number of predictors, the adjusted R^2 remained high at 0.409, confirming the model's stability and explanatory strength. The standard error of the estimate was 10.18, suggesting that the average deviation between predicted and observed scores was approximately 10.18 points, which is acceptable within educational outcome research standards (Cohen, 2013).

Examination of individual predictors revealed that both the DREEM total score and institution type made statistically significant unique contributions to the model. The DREEM score was a strong positive predictor of licensure examination performance ($\beta = 0.541, t = 14.27, p < .001$), indicating that higher perceived quality of the educational environment was associated with higher examination outcomes. Institution type also emerged as a significant predictor ($\beta = 0.178, t = 4.05, p < .001$), with students from public institutions achieving higher licensure scores on average compared to those from private institutions, after controlling for perceived educational environment. Preliminary diagnostics confirmed that the assumptions of linearity, independence of errors, homoscedasticity, and normality of residuals were adequately met. Variance inflation factors (VIFs) for all predictors were below 2, indicating no evidence of multicollinearity. Collectively, these findings underscore the substantial role of both the educational environment and institutional characteristics in influencing licensure examination outcomes, and they highlight key areas for institutional and policy-level interventions to enhance student

achievement and health workforce readiness. Table 18 presents the model summary and coefficients for the predictors included in the regression analysis.

Table 16: Model Summary of Regression Analysis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.642 ^a	.412	.409	10.18050
a. Predictors: (Constant), DREEM total Sum score, Institution Type				

- **R = 0.642:** A strong positive correlation between predicted and actual licensure scores.
- **R² = 0.412:** About 41.2% of the variance in licensure exam results is explained by DREEM score and institution type.
- **Adjusted R² = 0.409:** This slightly lower value corrects for model complexity, still indicating a strong model.
- **Standard Error = 10.18:** On average, predicted scores deviate about 10.18 points from actual exam scores.

Table 18: ANOVA summary for Licensure exam prediction

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35496.636	2	17748.318	171.245	.000 ^b
	Residual	50681.248	489	103.643		
	Total	86177.884	491			
a. Dependent Variable: Students Licensure Exam Result						
b. Predictors: (Constant), DREEM total Sum score, Institution Type						

- The model is statistically significant overall ($p < .001$).
- The F-statistic (171.245) is very high, indicating that the regression model fits the data significantly better than a model without predictors.

Table 19: Regression Coefficients predicting Licensure exam result

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.131	3.528		3.438	.001
	Institution Type	-7.221	.925	-.273	-7.806	.000
	DREEM total Sum score	.368	.023	.548	15.686	.000
a. Dependent Variable: Students Licensure Exam Result						

- This regression model significantly predicts licensure exam results ($p < .001$) and explains 41.2% of the variance — a strong model in educational research.
- Both predictors are statistically significant:
 - DREEM score has a strong positive effect, suggesting that a better-perceived educational environment is strongly associated with better exam performance.
 - Institution type has a Positivity effect, suggesting students from one type of institution (likely public) score higher on average, even after accounting for DREEM.

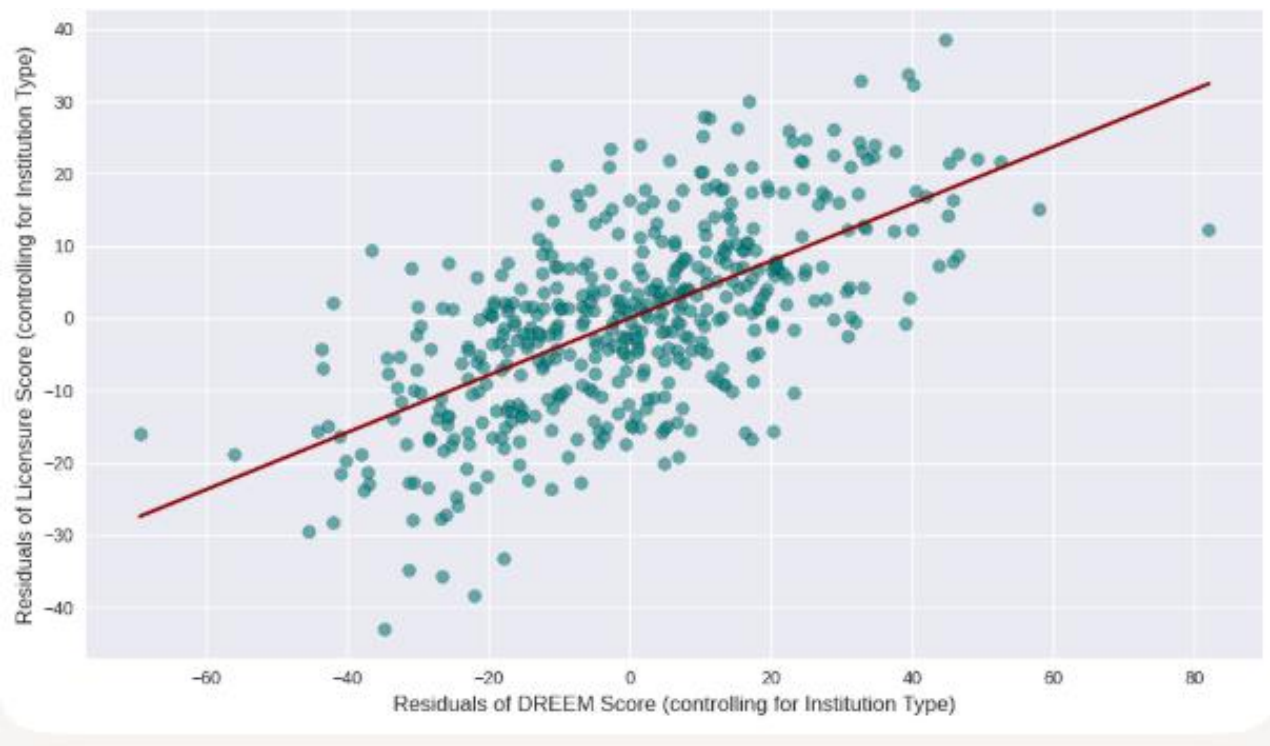


Figure 8: Regression plot: Unique contribution of Educational Environment

4.5. Challenges Faced by Graduates in Meeting Professional Standards in Public and Private HEIs

Introduction

This section presents the findings derived from the thematic analysis of in-depth interviews conducted with health science graduates, instructors and stakeholders from both public and private higher education institutions (HEIs) across Ethiopia. The qualitative component of the study aimed to explore participants lived experiences, perceptions, and insights related to the educational environment, teaching and learning processes, institutional practices, and systemic challenges within health science education.

The qualitative inquiry was guided by an interpretive approach, which allowed for an in-depth examination of the subjective experiences of participants while considering the social, institutional, and policy contexts influencing their perceptions. Data collection utilized semi-structured interview guides, enabling participants to freely express both the challenges they encounter and the potential solutions they envision for improving health science education.

Thematic analysis was employed to systematically identify, organize, and interpret patterns emerging from the qualitative data through an iterative process of repeatedly coding and reviewing until redundancy was reached, indicating data saturation. Multiple coders independently analyzed the transcripts to enhance reliability, resolving any discrepancies through discussion to maintain coding consistency. Simultaneously, quantitative data were collected and analyzed, enabling triangulation using a convergent parallel mixed-methods research design. This integration of qualitative themes and quantitative findings provided a more robust and comprehensive understanding of curriculum design, faculty competency, institutional leadership, student support, resource allocation, and policy implementation. To further enhance trustworthiness, techniques such as member checking, peer debriefing, and methodological triangulation were employed.

The following sections present the key themes that emerged from the analysis, supported by illustrative direct quotations from participants. These findings provide critical insights that complement the quantitative results, offering a more holistic understanding of the current state of health science education in Ethiopia and informing evidence-based recommendations for policy and practice.

4.5.1. Theme 1: Curriculum Alignment and Relevance Challenges

Participants consistently emphasized that the existing health science curricula in Ethiopian higher education institutions are frequently misaligned with the realities of clinical practice. Students and instructors described the curricula as heavily theoretical, often fragmented, and poorly sequenced, limiting students' ability to integrate and apply their knowledge effectively in clinical settings. Several participants highlighted the structure of major courses, which were often divided into multiple disconnected parts (e.g., "Part 1" and "Part 2"), delivered across separate semesters without clear academic continuity. This disjointed approach created significant difficulties in knowledge retention and application during practical training. Participants commented on this issue, stating,

"Some major courses were split without any academic logic. We had Part 1 in one semester and then waited too long for Part 2, which made it hard to retain and apply the knowledge."

This fragmented delivery not only disrupted the cognitive flow necessary for mastering complex clinical competencies but also contributed to students feeling unprepared when transitioning from classroom-based instruction to clinical placements. In hands-on disciplines such as Medicine, Nursing, Midwifery, and Radiologic Technology, where procedural skills and clinical decision-making are critical, these gaps were especially pronounced.

And also, Participants highlighted that the non-implementation of the competency-based curriculum is a major barrier to achieving adequate competency in health education programs. Specifically, across interviews, participants consistently mentioned,

"The competency-based curriculum has not been fully implemented due to several challenges, including lack of awareness, insufficient training, limited resources, and inadequate administrative support".

This situation reflects systemic issues that must be addressed to ensure the curriculum fulfills its intended role in improving health education quality and graduate readiness.

In addition, participants widely questioned the relevance and volume of general education courses, particularly those offered during the freshman year. While acknowledging the broader purpose of general education for intellectual development, many students expressed that non-health-related subjects such as geography, history, and physical education consumed substantial instructional time that could have been allocated to more specialized clinical training or laboratory practice. One of the participants mentioned,

“I don’t see why we are spending time on geography or history when we should be focusing on clinical procedures and patient care.”

Another recurring challenge was the apparent misalignment between the national licensure/exit examinations and the practical skills emphasized during training. Students from both public and private institutions reported that the licensure exam content often failed to reflect the clinical competencies and contextual knowledge required for effective healthcare delivery in Ethiopia. Many participants described the exam as overly theoretical and lacking sufficient clinical application, leaving them inadequately assessed on their readiness for real-world practice. Moreover, limited access to preparatory resources such as standardized practice exams, mock assessments, and exam blueprints further hindered their ability to adequately prepare. Some of the participants mentioned,

“The licensure exam felt completely disconnected from what we were taught and practiced. It doesn’t test our real competencies.”

Another participant mention about this issue,

“If we had sample questions or mock exams, we could prepare better. Right now, we’re just guessing what might appear.”

The lack of curriculum-exam alignment and sufficient preparatory support not only undermined students’ confidence but also raised concerns about the fairness and validity of the exit and licensure examination as a true measure of professional competence.

Suggested Solutions

To address these curriculum-related challenges, participants proposed several strategic reforms targeting both curriculum content and assessment design. Central to these reforms was the full implementation of the competency-based curriculum, which is essential for aligning educational outcomes with the practical skills and professional competencies required in health care. First, a comprehensive curriculum review was strongly recommended, led by collaborative efforts involving academic institutions, health professional councils, licensing bodies, and regulatory agencies. This review should ensure logical sequencing of courses, minimize redundancies, and promote the integration of theoretical knowledge with clinical practice through problem-based learning (PBL), case-based discussions, and simulation-based training. Effective implementation of a competency-based curriculum would enhance student preparedness, improve clinical decision-making, and ensure graduates meet the standards expected by the health sector.

“Involving us (students) in curriculum development would make a big difference because we know what gaps exist.”

Participants emphasized the importance of investing in skill and demonstration laboratories to enhance students' hands-on learning experiences. Participants stated,

"Ensuring adequate infrastructure including hiring more teachers, supplying sufficient teaching and learning materials, and establishing well-equipped skill and demonstration laboratories could help address the challenges related to competency-based curriculum implementation".

In terms of assessment reform, participants recommended a complete redesign of the national licensure examination to better reflect the competencies required in Ethiopia's healthcare system. This includes incorporating competency-based evaluations such as Objective Structured Clinical Examinations (OSCEs), scenario-based questions, and clinical reasoning assessments. Additionally, standardized preparatory materials such as exam blueprints, question banks, and mock exams should be developed and made widely accessible to ensure that all students, regardless of institutional type, have equitable preparation opportunities.

One participant mentioned,

“In addition to multiple-choice questions (MCQs), competency-based evaluations such as Objective Structured Clinical Examinations (OSCEs), scenario-based questions, and clinical reasoning assessments should be incorporated into the national high-stakes exams.”

This highlights the need for a more comprehensive assessment approach that goes beyond theoretical knowledge to evaluate practical skills and critical thinking. Incorporating these methods would better prepare graduates for real-world clinical challenges and ensure that the national examinations more accurately reflect the competencies required for effective health care practice.

Participants also called for a critical reassessment of freshman general education requirements. While acknowledging the value of interdisciplinary knowledge, they advocated for streamlining or integrating these courses into health science-relevant topics. For example, offering interdisciplinary courses like “Medical Geography” or “History of Medicine” could preserve broader educational goals while maintaining relevance to students' future professional roles.

Finally, several participants underscored the importance of involving key stakeholders including students, instructors, practicing clinicians, and healthcare employers in curriculum design and periodic revisions. Interviewees expressed concerns regarding this issue,

“During curriculum development, all stakeholders including students, instructors, practicing clinicians, and healthcare employers should participate to ensure greater clarity and more effective implementation”

Such participatory curriculum development processes would ensure that academic programs remain dynamic, responsive, and better aligned with the evolving demands of healthcare practice in Ethiopia.

4.5.2. Theme 2: Instructor Quality, Behavior, and Capacity Challenges

A major theme that emerged from participant interviews concerned the variability and inconsistency in teaching quality across instructors. While some faculty members were highly praised for their dedication, clarity, and clinical expertise, many students reported that others lacked pedagogical skills, clinical teaching competence, and the ability to translate theoretical instruction into practical application. This inconsistency was particularly problematic in skill-intensive disciplines such as medicine, Nursing, Midwifery, and Medical Radiologic Technology (MRT), where hands-on clinical competence is crucial. Participants reported that,

“We have very good teachers, but not all of them are equally committed or trained in modern teaching methods.”

Another participant mentioned that,

“There are instructors who just read from slides or textbooks without explaining the clinical relevance. That really affects our understanding.”

The lack of standardized teaching methodologies, limited faculty development opportunities, and weak oversight mechanisms were frequently cited as contributing factors to these variations in instructional quality.

Poor time management and scheduling conflicts further exacerbated instructional challenges. Students and instructors alike described frequent disruptions due to class cancellations, overlapping sessions, delayed clinical placements, and last-minute scheduling changes. These issues often resulted in reduced instructional hours, compressed lectures, and missed practical opportunities. Across interviews, participants consistently mentioned,

“Instructors should follow a schedule and make sure practices are in a timely manner. Sometimes our clinical practice starts without any prior notice or preparation.”

Another participant mentioned on this issue,

“We miss out on practical hours because of sudden cancellations or poor communication between departments.”

In addition to pedagogical and organizational challenges, several students described instances of authoritarian and unprofessional instructor behavior. Some instructors were reported to display intimidating, disrespectful, or emotionally charged behavior, particularly during clinical teaching. Such conduct created stressful learning environments that discouraged open communication and student engagement. One participant mentioned that,

“Some teachers get angry if you ask questions. It’s hard to learn when you feel afraid to speak up.”

Another participants mentioned,

“In the hospital, one instructor shouted at a student in front of patients. That was humiliating and unnecessary.”

These negative interactions were often linked to excessive workloads, limited faculty support systems, and insufficient training in educational psychology and communication.

A persistent shortage of qualified, full-time instructors further compounded instructional challenges. Many private institutions relied heavily on part-time, contract-based instructors who often lacked the time or institutional commitment to provide consistent supervision, mentorship, and academic guidance. Interviewees expressed,

“Some of our instructors are only available once a week. We never get a chance to ask questions or get support.”

Another participant mentioned that,

“In private institutions, many teachers are hired on a part-time basis. This limits their commitment and availability.”

Scheduling problems were reported to be more acute in private institutions, where faculty shortages often led to overburdened instructors managing multiple commitments simultaneously. One participant mentioned that,

“In private higher education institutions, there is a lack of permanent instructors; instead, many courses are taught by part-time instructors. These part-time instructors often rush through the

material, prioritizing coverage over interactive and meaningful learning within the scheduled time”.

The shortage was particularly acute in specialized areas such as radiology, midwifery, and diagnostic imaging, where highly skilled clinical instructors are essential.

Suggested Solutions

To address these instructor-related challenges, participants recommended a multi-pronged strategy:

Participants strongly emphasized the need for mandatory and ongoing faculty development programs to strengthen pedagogical skills, student engagement techniques, clinical teaching competency, and professional behavior. Such training should include modern instructional methods such as competency-based education, simulation-based training, adult learning principles, assessment literacy, and educational technology. Respondents highlighted that,

“Instructors need regular training not only on the subject but on how to teach it and engage with students.”

Institutions should prioritize hiring full-time faculty with both clinical expertise and teaching competence. Competitive salaries, research opportunities, clear promotion pathways, and institutional recognition of teaching excellence were recommended as incentives to attract and retain qualified staff. One participant mentioned that,

“It’s not enough to hire someone who knows the subject they should know how to teach it effectively.”

Institutions should establish comprehensive teaching evaluation systems that include classroom observations, student feedback, peer reviews, and teaching portfolios. This would help monitor instructional quality, provide constructive feedback, and ensure accountability for professional behavior. As expressed by a participant,

“Evaluating teachers regularly could improve quality. Good teachers would be rewarded, and weak areas would be addressed.”

Senior and experienced faculty should mentor junior instructors, providing guidance on teaching strategies, curriculum planning, and professional development. Such mentorship programs foster collaboration and help sustain institutional teaching standards.

Institutions should provide training in communication skills, emotional intelligence, and educational psychology to prevent authoritarian teaching behaviors and promote respectful

teacher-student relationships. Clear codes of conduct and grievance mechanisms should also be established to address unprofessional faculty behavior. In the words of one respondent,

“Teachers need to treat us like future professionals, not just students to control. Respect builds confidence.”

Participants called for better coordination between academic departments and clinical sites to avoid scheduling conflicts, overlapping classes, and last-minute cancellations. Clinical placements should be organized collaboratively with health facilities to ensure that students have sufficient and well-structured clinical exposure.

4.5.3. Theme 3: Institutional Governance and Accountability Challenges

Institutional governance and organizational factors were repeatedly highlighted by participants as significant barriers to effective health science education. Across both public and private higher education institutions (HEIs), students and instructors described weak institutional leadership, lack of supervision, poor accountability mechanisms, and disorganized management structures.

Many participants emphasized that insufficient institutional oversight allowed academic and administrative issues to persist without timely intervention. In both sectors, but more notably in private HEIs, there was a perception that institutional leadership often lacked the necessary academic focus and long-term vision required to maintain high educational standards. A participant explained,

“There is no proper follow-up on how courses are delivered. Nobody checks if instructors are doing their jobs properly.”

Another participant stated

“Sometimes we feel like the private institution cares more about running a business than giving us quality education.”

Several participants expressed concern about profit-driven motives dominating institutional decisions, especially in private colleges. This culture led to compromises in areas such as faculty recruitment, resource allocation, and class sizes, ultimately affecting the quality of student learning experiences. Most participants emphasized that,

“In private colleges, they admit many students to maximize profits, but there are not enough instructors or facilities to handle us properly.”

Participants from both public and private institutions also described disorganized institutional structures that resulted in scheduling conflicts, poor communication, and lack of coordinated academic and clinical training. Such administrative inefficiencies disrupted both theoretical learning and clinical practice schedules. One of the participants said,

“The departments don’t communicate well with each other. We find out about important schedules or changes at the last minute.”

Furthermore, many students expressed concerns about the lack of effective institutional support systems, highlighting that academic advising, mentorship, and career development services were either insufficient or completely missing. Similarly, instructors observed minimal administrative support in handling academic affairs, research initiatives, and faculty development programs. One student emphasized,

“We need advisors who can really follow our academic progress and guide us, but most of us are left to figure things out on our own.”

It is clear that strengthening these support structures is crucial for fostering a more supportive and productive academic environment. Without reliable guidance and administrative backing, both students and faculty may struggle to achieve their full potential, underscoring the urgent need for institutional commitment to comprehensive advising and mentorship programs.

Suggested Solutions

Participants proposed several actionable solutions to address these institutional-level deficiencies:

There was a strong call for institutional leadership with academic expertise, strategic vision, and administrative competence. HEIs should establish clear organizational structures with defined responsibilities and transparent decision-making processes to ensure efficient governance. Participant said that,

“We need leaders who understand both education and healthcare to properly run these institutions.”

Participants emphasized the importance of regular internal audits, academic quality assurance reviews, and supervisory bodies that oversee teaching quality, resource utilization, and student support services. These mechanisms would ensure that institutional operations remain aligned with educational standards and student needs. One of the participants emphasized that,

“There should be committees that evaluate both instructors and administrators regularly to keep everyone accountable.”

Participants recommended stronger government regulation and accreditation processes to curb excessive commercialization in private institutions. Financial motives should not overshadow academic integrity, and student intake should be balanced with available faculty and infrastructure. A participant explained,

“The government should control private institutions more strictly to make sure they meet minimum academic standards.”

Several participants advocated for a more inclusive governance model where students, faculty, and external stakeholders have a voice in institutional decision-making. Such participatory structures would allow institutions to remain responsive to the evolving needs of both students and the healthcare sector. As expressed by a participant,

“If students and teachers were involved in institutional decisions, many problems could be solved before they grow bigger.”

Institutions should invest in robust academic advising, career counseling, and mentorship programs to support student academic progression and professional development. Similarly, faculty members should receive administrative support for workload management, research activities, and career advancement. Participants reported that,

“We need academic advisors who meet with us regularly and give us practical career guidance, not just someone assigned on paper.”

Departments within HEIs should improve internal communication and coordination, particularly between academic, administrative, and clinical placement offices. Early publication of academic calendars, timely sharing of clinical rotation schedules, and collaborative planning between departments were suggested as practical steps. Participants mentioned,

“If the departments work together and plan ahead, it would avoid most of the scheduling problems we face every semester.”

Institutional and governance-related challenges must be thoroughly addressed to effectively implement the proposed solutions and enhance the overall quality of education. This involves strengthening leadership, ensuring transparent decision-making processes, improving resource allocation, and fostering accountability at all levels. Without resolving these foundational issues, efforts to improve educational outcomes may be limited or unsustainable.

4.5.4. Theme 4: Student Support, Academic Integrity, and Learning Strategies Challenges

Participants identified several student-related challenges that negatively influenced learning outcomes and overall academic success. These issues included inadequate academic advising, weak learning strategies, academic dishonesty, limited motivation, poor psychological support, and insufficient career guidance.

Many students reported that academic advising was either absent or poorly implemented. Without proper mentorship, students often felt isolated, confused about academic requirements, and unprepared for clinical and professional expectations. A participant explained,

“We only meet our assigned advisors when we have serious problems. There’s no ongoing guidance throughout the program.”

Another participant said,

“Sometimes we struggle with decisions about courses, internships, or career options, but there’s no one to ask.”

A recurring concern among participants was the growing culture of academic dishonesty, including cheating during exams and plagiarism in assignments. Some attributed this to high academic pressure, lack of supervision, and inadequate enforcement of academic integrity policies. One participant mentioned,

“Many students copy assignments or cheat on exams because there is little control or no serious consequences.”

Another participant added,

“If the system doesn’t take ethics seriously, students just follow the crowd.”

Several students acknowledged that many of their peers relied heavily on rote memorization rather than developing critical thinking, problem-solving, or self-directed learning skills. This approach hindered their ability to apply knowledge during clinical practice. One of the participants said,

“Most of us memorize notes for exams but forget everything after. We don’t learn how to analyze or make decisions in real situations.”

Another participant mentioned,

“We need more activities that force us to think, like case discussions and problem-solving tasks.”

The academic demands, combined with limited support services, left many students feeling overwhelmed and emotionally distressed. The absence of counseling or mental health services especially in private HEIs contributed to increased levels of anxiety, burnout, and academic failure. According to one interviewee,

“There are times when the stress is too much. We don’t have anyone to talk to about personal or academic problems.”

Another participant mentioned,

“Mental health support is almost non-existent, even though many students need it.”

Some students admitted to experiencing declining motivation during their studies, often due to a lack of clear professional pathways, career counseling, or understanding of their future roles in the health sector. One participant emphasized that,

“Sometimes it’s hard to stay motivated when you don’t know where your education is taking you.”

Another participant mentioned that,

“We need someone to guide us in setting career goals and understanding job opportunities after graduation.”

Student-related challenges pose serious and critical obstacles to educational success if effective strategies are not developed to address them. Without targeted interventions to manage these issues, students’ learning experiences and overall performance are likely to be negatively impacted, hindering both individual progress and institutional goals.

Suggested Solutions

Participants offered multiple student-centered strategies to address these challenges:

Institutions should establish structured and ongoing academic advising systems. Advisors should proactively meet students, monitor academic progress, and offer career counseling tailored to each student’s interests and competencies. One participant mentioned,

“If advisors met with us regularly, many academic and personal problems could be prevented early on.”

HEIs must implement and enforce clear academic integrity policies, including honor codes, strict exam protocols, plagiarism detection software, and educational sessions on professional ethics. Institutions should cultivate an academic culture that values honesty and integrity. One participant said,

“If students understand that cheating will not be tolerated, they’ll focus more on real learning.”

Curricula should include more active learning components such as problem-based learning, clinical simulations, and case-based discussions that foster critical thinking, decision-making, and independent learning habits. According to one interviewee,

“When we discuss real patient cases, it forces us to think and apply what we’ve learned.”

Institutions should invest in trained mental health counselors, accessible psychological services, and stress management programs to support students’ well-being. Participants mentioned,

“Just knowing there’s a professional counselor available would make a big difference when things get overwhelming.”

Career orientation programs, including workshops, alumni talk, and field exposure visits, should be introduced to help students understand their future roles and professional opportunities, keeping them motivated throughout their studies. As expressed by a participant,

“When we hear from alumni working in hospitals, it helps us picture our own future and stay focused.”

The solutions outlined above have the potential to effectively address the student-related challenges by providing targeted support and resources. By implementing these strategies, institutions can improve academic advising, enhance mentorship programs, offer psychological support, and create an inclusive learning environment that fosters student success and well-being.

4.5.5. Theme 5: Resource and Infrastructure Deficiencies Challenges

A dominant concern across both public and private health science institutions was the shortage and uneven distribution of essential educational resources and infrastructure. Participants consistently highlighted that resource limitations directly compromised the quality of both theoretical instruction and clinical training.

Students from nearly all programs noted that practical sessions were compromised by poorly equipped or non-functional laboratories. Simulation equipment, which is critical for developing clinical and procedural skills in a safe environment, was often unavailable or outdated. In the words of one respondent,

“Sometimes we only observe procedures instead of practicing them because the simulation labs don’t have enough equipment.”

Another participant mentioned,

“We are expected to know how to handle patients, but we’ve never practiced with proper mannequins or clinical models.”

Many students reported that library resources were insufficient, with limited access to updated textbooks, clinical guidelines, or online databases. Both digital and physical learning resources were often outdated and not aligned with current medical practice. One participant stated,

“The books in the library are old editions. We can’t find recent references or journals to prepare well.”

Another participant said,

“Internet access is weak and unreliable, making it hard to do online research or access e-learning platforms.”

Particularly for students in urban areas or those required to travel to affiliated hospitals, transportation difficulties disrupted timely attendance at clinical sites, limited clinical exposure, and caused frequent absenteeism. As one participant stated,

“We sometimes miss our clinical practice hours because we don’t have transportation, or the bus arrives too late.”

Another participant stated,

“It’s difficult to learn when we’re worried about how to get to the hospital every day.”

Both public and private institution students reported that increasing student enrollment without corresponding expansion of clinical sites led to overcrowded clinical training environments. This diluted opportunities for hands-on practice. Participants mentioned that,

“There are too many students for a limited number of patients. Sometimes we have to just watch instead of doing procedures ourselves.”

Another participant mentioned,

“We compete for patient cases, and often we don’t get enough exposure to common procedures.”

Participants from private colleges particularly emphasized that resource gaps were more severe in their institutions compared to public universities, which often had access to larger teaching hospitals and government funding.

“In private colleges, we lack many essential facilities that public universities have. This puts us at a disadvantage.”

Resource-related challenges represent a significant obstacle faced by both public and private higher education institutions (HEIs), impacting their ability to deliver quality education, conduct research, and maintain infrastructure effectively.

Suggested Solutions

Participants proposed a range of practical solutions to address resource-related deficiencies:

Institutions should prioritize the acquisition and maintenance of modern laboratory equipment and clinical simulation centers. Simulation-based training should be fully integrated into health science curricula to enhance skill acquisition before clinical exposure. One participant mentioned,

“With well-equipped simulation labs, we could practice confidently before working with real patients.”

HEIs should update library collections with recent textbooks, clinical guidelines, and peer-reviewed journals. Digital infrastructure, including high-speed internet, online databases, and e-learning platforms, should be expanded to facilitate contemporary medical education. Participants stated,

“We need updated e-books and online resources that reflect current practice standards.”

Institutions, in collaboration with respected bodies, should provide reliable transportation services for students attending clinical placements. Clinical sites should be better coordinated to ensure adequate clinical exposure for all students. As one participant stated,

“If transportation is provided regularly, we won’t have to worry about missing important clinical hours.”

Government regulatory bodies should monitor student admissions to ensure that intake numbers align with institutional capacity, particularly regarding clinical placement opportunities. Institutions should not accept more students than they can adequately train. Participants emphasized that,

“Enrollment should match the number of available practice sites so everyone gets enough hands-on experience.”

The proposed solutions outlined above are essential for effectively addressing the resource-related challenges.

4.5.6. Theme 6: Policy and System-Level Gaps Challenges

Throughout the interviews, both students and instructors expressed significant concerns about systemic issues related to national education policies and governance structures. While comprehensive policy documents and guidelines exist to regulate health science education in Ethiopia, participants consistently reported a pervasive gap between policy intentions and practical implementation.

Many participants criticized the lack of consistent monitoring mechanisms to ensure institutional compliance with national education standards, particularly within private sector institutions. Although regulatory bodies such as the education and training authority and relevant professional councils are tasked with oversight, enforcement was described as fragmented, sporadic, or even absent. A participant explained,

“Policies exist on paper, but nobody checks properly whether institutions follow them.”

Another participant mentioned,

“Private colleges sometimes operate without enough instructors or resources because there’s no strong supervision.”

The absence of effective accountability systems was seen as contributing to the uneven quality of health science education across institutions. A recurring sentiment was that frontline educators, students, and clinical supervisors are rarely consulted when policies and guidelines are developed or revised. This top-down approach often results in policies that are disconnected from the practical realities faced by those delivering and receiving education. In the words of one respondent,

“Stakeholders like us should be part of shaping the policies because we live the challenges every day.”

Another participant emphasized,

“If policymakers listened to instructors and students, they would better understand what works and what doesn’t.”

This disconnect between policy design and institutional realities leads to impractical standards and unrealistic expectations. Both faculty and students voiced concerns about the limited availability of postgraduate training programs within Ethiopia. The scarcity of advanced education opportunities hinders career advancement, professional growth, and the development of a highly skilled healthcare workforce. One of the participants mentioned,

“Without postgraduate opportunities, many professionals feel stuck and unmotivated.”

Another participant stated,

“We need clear career paths after graduation. Otherwise, many leave the profession or go abroad.”

The lack of structured pathways for continuing professional education also contributes to faculty shortages, as fewer individuals are trained to become future instructors, clinical educators, and academic leaders.

Participants from private institutions particularly emphasized inconsistencies in accreditation and licensing processes. Some reported that institutions were accredited despite obvious deficiencies in faculty, facilities, or clinical partnerships. According to one interviewee,

“Some colleges get accreditation even when they don’t meet minimum standards. That’s not fair to students.”

Another participant mentioned that,

“Public higher education institutions (HEIs) have not received accreditation from recognized accrediting bodies, which raises concerns about the quality assurance and standards of their academic programs”

Such irregularities undermine public trust in the health education system and create inequities in graduate competencies across institutions.

Suggested Solutions

Participants offered several actionable solutions to strengthen policy implementation and create a more robust, equitable health science education system in Ethiopia:

Government agencies and professional councils should enhance enforcement of existing regulations through routine audits, standardized institutional evaluations, and clearly defined accountability measures. Periodic institutional reviews should assess faculty qualifications, infrastructure, curriculum implementation, and student outcomes. Interviewees expressed concerns regarding this issue,

“Institutions need regular inspections to make sure they meet standards, not just when they apply for accreditation.”

Accreditation standards should be transparent, objective, and uniformly applied across both public and private institutions. Accreditation decisions should be based on comprehensive,

regularly updated criteria that emphasize both academic quality and clinical training capacity. Participants mentioned,

“Fair and equal accreditation protects students and the health system.”

Policy formulation should actively engage multiple stakeholders including students, educators, healthcare providers, professional associations, and employers to ensure policies are grounded in practical realities. Mechanisms such as advisory boards, stakeholder consultations, and policy workshops can support participatory governance. Participants reported that,

“We need seats at the table when decisions are made.”

Institutions should collaborate with government agencies, international partners, and healthcare organizations to increase the availability of specialized postgraduate programs in clinical disciplines, education, and health management. Clear academic career pathways will help retain talent and build faculty capacity. One of the participants mentioned,

“More postgraduate opportunities mean more qualified instructors for the future.”

Institutions should establish internal quality assurance offices tasked with translating national policies into operational guidelines, ensuring that regulatory standards are implemented consistently in day-to-day activities. As expressed by a participant,

“There should be people within each institution making sure policies are followed, not just waiting for outside inspections.”

Policy reforms should focus on reducing the disparity between public and private institutions through resource-sharing agreements, government subsidies, and partnership models to strengthen private sector education quality. One participant mentioned,

“The government should support private institutions too, so the quality of education becomes more equal for everyone.”

Policy and system-level challenges must be addressed through collaborative efforts involving all relevant stakeholders, including government agencies, educational institutions, professional bodies, and healthcare providers. Such coordinated action is essential to create effective policies, improve regulatory frameworks, and strengthen governance structures, ultimately enhancing the quality and effectiveness of health professional education.

Overall Summary of Qualitative Findings

The thematic analysis reveals that health science education in Ethiopia faces complex and interdependent challenges across multiple levels curriculum design, instructional quality, institutional governance, student support, resource allocation, and policy implementation. These challenges compromise both educational outcomes and healthcare workforce development. However, participants also offered comprehensive, practical, and actionable solutions that, if systematically implemented, can significantly improve the quality and effectiveness of health science education across both public and private institutions in Ethiopia.

Summary table of Qualitative Findings

Theme	Challenges	Proposed Solutions
Curriculum Alignment & Relevance	• Misaligned curricula with clinical realities • Non-implementation of competency-based curriculum • Questionable relevance and excessive freshman general education courses • Misalignment between licensure exams and training • Concerns about fairness/validity of exams	• Reform curriculum and assessment design • Full implementation of competency-based curriculum • Integrate theory with practice (PBL, case-based, simulation) • Invest in skill labs • Redesign licensure exams (OSCEs, scenario-based) • Reassess general education requirements • Involve stakeholders in curriculum revisions
Instructor Quality, Behavior & Capacity	• Inconsistent teaching quality • Lack of standardized methodologies • Scheduling conflicts • Authoritarian/unprofessional behavior • Shortage of qualified full-time instructors	• Ongoing faculty development programs • Hire full-time faculty with clinical/teaching expertise • Comprehensive teaching evaluation systems • Senior faculty mentoring junior staff • Training in communication & emotional intelligence • Better coordination between departments & clinical sites
Institutional	• Weak leadership	• Strengthen leadership with academic vision

Theme	Challenges	Proposed Solutions
Governance & Accountability	• Lack of advising, mentorship, career services • Poor accountability mechanisms • Disorganized management • Profit-driven motives in private institutions	• Clear organizational structures & transparent decisions • Internal audits & quality assurance reviews • Stronger government regulation & accreditation • Inclusive governance with stakeholder input • Invest in advising & mentorship • Improve internal communication
Student Support, Integrity & Learning Strategies	• Inadequate advising • Weak learning strategies • Academic dishonesty • Low motivation • Poor psychological support • Insufficient career guidance	• Structured advising systems • Enforce integrity policies (honor codes, plagiarism detection) • Active learning strategies • Mental health counselors & stress programs • Career orientation workshops, alumni talks, field visits
Resource & Infrastructure Deficiencies	• Shortage/uneven distribution of resources • Poorly equipped labs • Insufficient library resources • Transportation difficulties • Overcrowded clinical training	• Modern labs & simulation centers • Updated library collections • Reliable transportation for placements • Regulate admissions to match capacity
Policy & System-Level Gaps	• Gap between policy and practice • Lack of monitoring mechanisms • Weak accountability • No structured continuing education • Inconsistent accreditation/licensing	• Stronger enforcement via audits & evaluations • Transparent, uniform accreditation standards • Stakeholder engagement in policy formulation • Expand postgraduate programs via partnerships • Internal quality assurance offices • Reduce disparities between public/private institutions

Chapter 5: Discussion

5.1. Introduction

The primary aim of this study was to conduct a comprehensive comparison of the educational environments and student achievement in public and private higher education institutions (HEIs) offering health professionals' education in Ethiopia. Using a mixed-methods approach quantitative data collected through the Dundee Ready Education Environment Measure (DREEM) and licensure examination results, alongside qualitative insights from interviews with students and faculty the research sought to evaluate institutional quality, student academic performance, and the challenges faced in aligning health education with national professional standards.

This discussion integrates and interprets the key findings in relation to the study's objectives, existing literature, and broader contextual realities in Ethiopia's higher education and healthcare systems. The chapter explores the implications of students' perceptions of their learning environment, differences between public and private institutions, and how these educational factors influence licensure exam performance. Furthermore, the discussion incorporates qualitative evidence on institutional challenges and provides policy-relevant recommendations for strengthening the quality and equity of health professionals' education in the country.

By examining both quantitative and qualitative dimensions, this analysis not only sheds light on the current state of health education in Ethiopia but also contributes to the growing body of international literature on the impact of educational climate on health workforce development. The following sections are organized thematically to address the study's core research questions and provide a nuanced understanding of the findings.

5.2. Response Rate and Sample Characteristics

The study achieved a robust response rate of 78.59%, with 492 out of 626 invited participants completing the DREEM questionnaire. The gender distribution was nearly balanced (51.82% male; 48.18% female), and institutional representation was almost equal between public (50.41%) and private (49.59%) higher education institutions (HEIs). This balanced distribution enhances the validity and generalizability of the findings and supports meaningful comparative analysis across institutional types and genders. The near-equal representation aligns with trends in Ethiopia's health education system, where efforts have been made to ensure gender equity and expand private sector involvement in health professions education (FMOH, 2020).

5.3. Perceptions of the Educational Environment

This study aimed to assess and compare health science students' perceptions of their educational environment in public and private higher education institutions in Ethiopia. The DREEM tool was utilized to systematically evaluate students' experiences, perceptions of teaching and learning, and to identify potential problem areas within the educational programs of these institutions.

5.3.1. Overall Educational Environment Score

The present study aimed to evaluate the educational environment of health science students enrolled in public and private higher education institutions in Ethiopia using the Dundee Ready Education Environment Measure (DREEM). The DREEM instrument is a globally validated tool designed to assess students' perceptions across five core domains: Students' Perceptions of Learning (SPL), Students' Perceptions of Teachers (SPT), Students' Academic Self-Perceptions (SAP), Students' Perceptions of Atmosphere (SPA), and Students' Social Self-Perceptions (SSP)(Roff, 2005). The overall mean score of 138 out of a maximum 200 on the Dundee Ready Education Environment Measure (DREEM) indicates that students in the present study perceive their learning environment as “more positive than negative,” based on the interpretive guidelines provided by (Roff, 2005). These findings suggest that, overall, the academic atmosphere within the assessed institutions is generally supportive and conducive to effective learning. However, the results also highlight that there remains considerable scope for further enhancement of the educational environment. The overall mean DREEM scores were found to fall within a category that is one level below the ‘excellent’ range, which is defined by an overall mean score of 151–200 out of a possible 200. This indicates that while the current educational climate demonstrates several positive attributes, there are still identifiable areas requiring targeted improvements to optimize the learning experience and foster academic excellence across all dimensions assessed by the DREEM instrument (J. Genn, 2001a; McAleer & Roff, 2001). The findings of this study provide valuable insights into the strengths and weaknesses of the educational environment as perceived by the students and offer important implications for policy, curriculum design, and faculty development.

The overall mean DREEM score obtained in this study indicated that students perceived their educational environment as having ‘more positive than negative’, according to the DREEM interpretation guidelines (Roff et al., 1997a). Previous research has demonstrated that higher DREEM scores reflect a more supportive, student-centered, and effective educational environment, whereas lower scores are suggestive of deficiencies in curriculum design, teaching

quality, or institutional support that may hinder student learning and development (Kohli & Dhaliwal, 2013).

However, the findings of the present study revealed that, despite some challenges, health science students in both public and private higher education institutions (HEIs) in Ethiopia generally held a more positive than negative perception of their educational environment. This was evident across the total DREEM score, its five subscales Students' Perceptions of Learning, Students' Perceptions of Teachers, Students' Academic Self-Perceptions, Students' Perceptions of Atmosphere, and Students' Social Self-Perceptions as well as in the analysis of individual items.

These results align with findings from similar studies conducted in diverse international contexts, including Iran, Chinese, UK, Sri Lanka, Saudi Arabia, Nepal, Nigeria, Chile, Jamaica, Sweden, Kuwait, Malaysia, Pakistan and Korea all of which reported generally positive student perceptions of the educational environment in health sciences education (Bakhshialiabad et al., 2015; Jawaid et al., 2013; Naik, 2012; Park et al., 2015). This result is consistent with findings from other studies conducted in similar academic contexts. For example, (Samson et al., 2021) reported a DREEM mean score of 142.64, also within the "more positive than negative" range, reflecting a broadly favorable perception of the educational environment. Likewise, (Saha et al., 2024) found that while students perceived their educational environment positively, there was a clear indication of areas needing enhancement particularly in the domains of teaching methods and student well-being.

Although a score of 138 reflects a relatively healthy learning environment, it still falls short of the benchmark score of >150, which would denote an "excellent educational environment." (Roff, 2005) This shortfall indicates that students may still encounter challenges related to the quality of instructional delivery, faculty engagement, stress management, and availability of social and psychological support services. Several studies support the notion that while academic institutions may meet baseline expectations for educational quality, further investment in teaching innovation and student support is essential to achieving excellence (Al-Hazimi et al., 2004; Varma et al., 2005).

In contrast to the findings of the current study, research conducted among nursing students in Egypt reported a generally poor perception of their educational environment, as reflected in lower DREEM scores (Sharkawy et al., 2013). Similarly, studies from a medical college in Riyadh reported an overall DREEM score of 89.9, indicating significant concerns regarding the educational climate (Al-Ayed & Sheik, 2008). Comparable findings were observed in medical

schools in Iran, where total DREEM scores of 99.6 and 98 were reported, suggesting the presence of potential problems in the educational environment (Aghamolaei & Fazel, 2010).

The discrepancies between these studies and the present findings may be attributed to several contextual factors, including differences in the study populations, cultural expectations, institutional resources, and socioeconomic backgrounds of the students. Students in low-income countries, such as Ethiopia, may have relatively lower expectations from their universities due to limited educational resources, and as a result, may adapt more easily to the available learning environment (Dudaite, 2016). Socioeconomic status not only shapes students' perceptions of their educational environment but also influences their academic performance and overall educational experience (Salameh, 2012). This may partly explain why students from both public and private higher education institutions in our study demonstrated generally comparable and more positive perceptions of their educational environment. Nevertheless, while the health science students in both public and private HEIs exhibited overall positive perceptions across the total and subscale DREEM scores, this does not imply uniform satisfaction across all individual components of the educational environment. Certain aspects of the learning environment may still present challenges that warrant targeted interventions. Addressing these specific problem areas could enhance students' learning approaches, promote more effective educational experiences, and ultimately improve their academic performance (Mørk et al., 2020).

Importantly, the DREEM subscale scores in this study suggest that particular areas such as student perception of teaching and atmosphere may benefit from targeted interventions. Prior research highlights the value of interactive and student-centered learning methods, mentorship programs, and well-being services in creating a more holistic and motivating educational environment (Kossioni et al., 2012). Addressing these identified areas is essential not only for enhancing the overall academic experience but also for supporting the development of professional identity, ethical practice, and clinical competence among future health professionals. The educational environment plays a critical role in shaping students' attitudes, motivation, and preparedness for professional practice, making its continuous evaluation and improvement a priority for health science education programs. One of the key strengths of the DREEM inventory lies in its ability to analyze individual items, allowing for a granular assessment that highlights specific strengths and weaknesses within various dimensions of the educational environment. The analysis of individual item scores provides valuable insights into areas where students perceive deficiencies or challenges, thereby enabling institutions to implement targeted interventions. In the present study, several weak areas were identified based on student feedback,

indicating aspects of the educational environment that warrant focused attention and strategic improvement efforts.

5.3.2. Student Perception of Learning (SPoL)

The findings from the Students' Perceptions of Learning (SPL) subscale indicate that students in both public and private health science institutions in Ethiopia perceived their learning experiences as moderately positive, though with identifiable deficiencies. The SPL subscale of the Dundee Ready Education Environment Measure (DREEM) is designed to evaluate various dimensions of the learning process, including clarity of teaching, student engagement, relevance of learning content, encouragement for active learning, and promotion of self-directed learning (Roff, 2005). The Student Perception of Learning (SPoL) subscale achieved an overall mean score of 33.11 out of 48, suggesting that students generally hold positive perceptions of their learning environment. According to the DREEM interpretive framework (Reiner et al., 2002; Roff, 2005), this score reflects a learning environment that supports student engagement and facilitates academic development, though it still falls short of the ideal benchmark indicative of an “excellent” educational atmosphere. Consistent with the broader literature, students generally reported agreement with positive items related to the perceived relevance of course content and the acquisition of knowledge applicable to future professional roles (Kohli & Dhaliwal, 2013; Palmgren & Chandratilake, 2011). This suggests that the curriculum content, at least in its core elements, is perceived as professionally meaningful and aligned with students’ anticipated career pathways, an essential component of adult learning theory and professional identity formation (Cruess et al., 2016; Knowles et al., 2014).

The overall Student Perception of Learning (SPoL) subscale score of 33.11 out of 48 reflects a generally favorable learning environment. While this score indicates a positive perception, it remains below the threshold associated with an "excellent" learning environment. This balanced yet suboptimal result warrants closer analysis of specific student experiences to better understand strengths and areas for improvement within the educational setting.

Two salient findings emerged from the SPoL subscale: first, students strongly agreed that educators actively encouraged classroom participation, and second, one of the lowest-rated items reflected a lack of emphasis on long-term learning. Together, these responses offer critical insight into the current pedagogical climate of health professions education.

The item regarding instructor encouragement of student participation received the highest rating within the SPoL subscale, indicating that students perceive their learning environment as interactive and supportive. This finding aligns with a substantial body of literature emphasizing

the value of active learning approaches. For instance, (Parks-Stamm et al., 2017) argue that teaching strategies which promote student interaction such as small group discussions and collaborative tasks enhance learners' cognitive engagement, foster deeper understanding, and build confidence. Similarly, (Ing et al., 2015) highlight that student-centered learning environments increase motivation, academic persistence, and satisfaction.

Empirical findings also support this perspective. A study published in *BMC Medical Education* demonstrated that instructor-led engagement strategies significantly improve both behavioral and cognitive involvement, leading to better academic performance and reduced dropout rates (Kassab et al., 2024). In the Ethiopian context, research published in *PLOS ONE* further confirmed that teacher encouragement and responsiveness are key predictors of academic success, especially in resource-constrained settings where relational pedagogy helps mitigate institutional limitations (Faro et al., 2025).

These converging lines of evidence suggest that the strong agreement with the participation-related item is a positive indicator of teaching quality and classroom dynamics. Students appear to be active participants in the learning process rather than passive recipients of information, a characteristic essential for cultivating the competencies required in clinical and community health settings.

However, notable concerns were raised in relation to teaching strategies and the promotion of critical thinking and problem-solving skills. Students across both institutional types expressed lower satisfaction with the extent to which learning strategies fostered active engagement, independent inquiry, and application of knowledge to practical scenarios. These findings reflect ongoing challenges in many health sciences curricula, which often remain overly reliant on didactic, teacher-centered instruction rather than interactive, student-centered pedagogies that foster deeper learning (Harden, 2005; Spencer & Jordan, 1999).

Active learning approaches, such as problem-based learning (PBL), team-based learning (TBL), and simulation-based instruction, have been widely advocated as effective strategies to enhance knowledge retention, critical thinking, and clinical reasoning in health professional education (Burgess et al., 2014; Michael, 2006). Several studies have demonstrated that such approaches not only improve cognitive outcomes but also foster motivation, collaboration, and professional skills essential for clinical practice (Burgess et al., 2014; Dolmans et al., 2005). The relatively weaker scores in problem-solving and learning strategy items suggest that these active learning methods may not be fully or consistently implemented across institutions in the present study.

Moreover, the concern raised by students regarding insufficient feedback and guidance during the learning process mirrors challenges identified globally in medical and health professions education (Archer, 2010; Sargeant et al., 2008). Effective feedback is critical for promoting self-regulated learning, enhancing performance, and guiding students towards higher levels of competence (Hattie & Timperley, 2007; Watling et al., 2013). Faculty development programs emphasizing feedback delivery, learner-centered teaching, and mentorship are vital for addressing these gaps (Steinert et al., 2006).

The differences observed between public and private institutions may partly reflect resource disparities, faculty expertise, and variability in faculty development opportunities. Public universities, often with longer histories and more established academic cultures, may have better-developed infrastructures and more experienced faculty capable of delivering student-centered learning (Education, 2013; Frenk et al., 2010a). In contrast, many private institutions, especially newer ones, may struggle with limited teaching resources and a lack of systematic faculty development (Gruppen et al., 2019; Kusurkar et al., 2011).

Addressing these deficiencies requires a multipronged strategy: revising curricula to incorporate active learning pedagogies, investing in faculty development, ensuring smaller teacher-to-student ratios for interactive teaching, and fostering institutional cultures that support educational innovation (Harden, 2005; Steinert et al., 2006). Such reforms would better prepare students not only to master knowledge but also to develop the higher-order cognitive and problem-solving skills essential for contemporary healthcare practice.

In sum, while the high rating for participatory teaching practices is encouraging and reflective of an interactive and engaging educational culture, the perceived neglect of long-term learning goals represents a critical area for improvement. To achieve a truly excellent educational environment, health professions education in both public and private institutions must strive to integrate active learning methods with a curriculum that emphasizes continuity, conceptual integration, and reflective practice.

5.3.3. Students' Perceptions of Teachers (SPoT)

The Students' Perceptions of Teachers (SPT) subscale revealed that students across both public and private health science institutions generally held moderately positive views regarding the quality of teaching they receive, while also identifying areas requiring significant enhancement. This subscale assesses students' perceptions of their teachers' competence, attitudes, preparation, communication, and ability to stimulate interest in learning (Roff, 2005). The SPoT (Students' Perceptions of Teachers) subscale yielded mean scores of 32.99 out of 44 in public HEIs and

32.07 out of 44 in private HEIs, both falling within the “moving in the right direction” category. The lack of a statistically significant difference between the two sectors suggests that students across both public and private institutions generally maintain a positive perception of their teachers. Educators were consistently viewed as knowledgeable, well-prepared, and competent in clinical instruction indicators of strong faculty performance. Comparable results were reported by (Kohli & Dhaliwal, 2013; Vaughan et al., 2014), where DREEM scores ranging from 133 to 145 reflected high student confidence in teaching quality. Similarly, (DoShi et al., 2014) found that students in medical colleges rated faculty members highly in terms of preparedness and subject matter expertise.

The results from this study indicated that many students expressed agreement with positive statements related to their teachers’ subject knowledge, professionalism, and commitment to student learning. These findings are consistent with prior studies emphasizing the important role of teachers as both content experts and professional role models in the health professions (Irby & Hamstra, 2016; Sutkin et al., 2008). Competent and supportive teachers have been shown to foster student motivation, deepen understanding, and enhance professional identity formation (Cruess et al., 2016; Hafferty, 2006).

Despite overall positive ratings, students reported instances of authoritarian teaching behavior and expressions of anger by instructors, which echo recurring issues in global DREEM findings. Specifically, low-rated items such as “teachers are authoritarian” and “teachers get angry” frequently appeared in studies from India and Sri Lanka (DoShi et al., 2014; Mudiyanse et al., 2015). In Sri Lanka, instructors who were authoritarian undermined student confidence, while angry behavior discouraged participation (Mudiyanse et al., 2015).

Several areas of concern emerged, especially regarding teachers’ teaching methods, feedback provision, and approachability. Students in both public and private institutions indicated dissatisfaction with some aspects of teacher-student interactions, particularly the ability of teachers to engage students, promote critical thinking, and deliver timely, constructive feedback. These concerns mirror challenges identified globally, where many health sciences educators, although clinically skilled, may lack adequate pedagogical training to adopt learner-centered approaches that actively engage students in knowledge construction (Gruppen et al., 2019; Spencer & Jordan, 1999; Steinert et al., 2006).

Effective teaching in the health sciences demands not only subject expertise but also proficiency in educational principles such as adult learning theory, effective questioning, interactive teaching, and feedback provision (Cantillon & Sargeant, 2008; Harden, 2005). In particular, feedback has been consistently highlighted as one of the most powerful influences on student learning, yet is frequently underutilized or poorly executed (Harden, 2005; Watling et al., 2013). The dissatisfaction expressed by students in this area suggests a need for targeted faculty development to enhance teachers' feedback skills and establish feedback-rich learning environments.

Moreover, students reported variability in teachers' approachability and willingness to engage in supportive mentorship relationships. A strong teacher-student rapport has been shown to buffer academic stress, promote student resilience, and create a safe environment for inquiry and learning (Dyrbye et al., 2006; Fares et al., 2016). Institutions should therefore prioritize cultivating teaching cultures that emphasize approachability, empathy, and student-centeredness.

Notably, the differences observed between public and private institutions in the SPT subscale may reflect underlying disparities in faculty development opportunities, teaching experience, and institutional investment in teaching excellence (Kusurkar et al., 2011). Public universities, often with larger faculty cohorts and longer institutional histories, may have more established systems of academic mentorship, peer observation, and pedagogical training that support better teaching performance (Frenk et al., 2010a).

Addressing the identified deficiencies requires a comprehensive faculty development agenda that emphasizes evidence-based teaching methods, communication skills, feedback delivery, and reflective practice (Harden, 2005; Steinert et al., 2006). Faculty members should be encouraged to participate in structured teaching skills workshops, peer coaching, and ongoing educational scholarship to ensure they remain current with evolving best practices in health professions education (Ramani & Leinster, 2008; Steinert et al., 2006).

In conclusion, while students' perceptions of their teachers were generally more positive than negative, important gaps remain in teaching strategies, feedback provision, and relational aspects of teaching. Institutional efforts that focus on sustained faculty development, supportive teaching cultures, and the promotion of educational scholarship will be critical in strengthening teaching quality and ultimately improving student learning outcomes in health sciences education.

5.3.4. Students' Academic Self-Perception (SAP)

The present study revealed that students from both public and private higher education institutions in Ethiopia demonstrated a moderately positive perception of their academic self-efficacy, as measured by the Students' Academic Self-Perception (SAP) subscale of the Dundee Ready Education Environment Measure (DREEM). Specifically, the mean SAP scores were 16.76 and 15.85 out of a possible 24 for public and private institutions, respectively. These scores fall within the interpretative range of "feeling more on the positive side," indicating a general sense of academic self-assurance among students. This finding aligns with prior research suggesting that students' perceptions of their academic competence significantly influence their motivation, engagement, and performance in professional health education programs (Artino, 2012).

Students' agreement with positively framed items particularly those reflecting the perceived relevance of academic learning to future professional roles is encouraging. Many students reported that their educational experience had equipped them with valuable knowledge about empathy and professional behavior, which are essential attributes in health-related disciplines (Sharma et al., 2018). The recognition of the applicability of academic content to future careers enhances the meaningfulness of learning, which is a key component of self-determination theory (Deci & Ryan, 2000), and has been linked to better academic outcomes and deeper learning approaches (Ten Cate et al., 2011).

However, the study also uncovered critical areas of concern within the SAP subscale. Across both institutional types, students expressed lower levels of confidence in their learning strategies and problem-solving abilities. These concerns suggest that while students value the content of their education, they may not feel adequately supported in developing the metacognitive and analytical skills needed for lifelong learning and professional adaptability. This aligns with findings from previous studies indicating that poorly structured curricula and teacher-centered pedagogies can undermine students' development of critical thinking and independent learning skills (Frenk et al., 2010; Dolmans et al., 2005).

The discomfort reported by students regarding learning strategies may reflect a misalignment between teaching methods and students preferred or most effective modes of learning. For instance, heavy reliance on rote memorization, didactic lectures, or infrequent use of active learning techniques such as case-based or problem-based learning (PBL) may hinder students from developing the higher-order thinking skills essential for clinical reasoning and evidence-based practice (Al Kadri et al., 2011). Furthermore, limited formative feedback and insufficient

scaffolding may contribute to students' lack of confidence in their problem-solving capabilities (Eva, 2005).

These findings highlight the need for institutional reforms aimed at enhancing teaching and learning strategies. Faculty development initiatives should focus on training instructors in learner-centered pedagogies, such as PBL, team-based learning, and experiential learning approaches, which have been shown to promote deeper understanding and problem-solving skills among health professions students (Hmelo-Silver, 2004; Mohammed et al., 2024; Steinert et al., 2006). In addition, integrating reflective practice, structured feedback mechanisms, and academic coaching could help students become more confident and autonomous learners.

Moreover, the difference in SAP scores between public and private institutions, albeit modest, may suggest underlying disparities in academic support systems, faculty engagement, or resource availability, which merit further investigation. Ensuring equitable access to high-quality instruction and learning resources is crucial for maintaining academic standards and producing competent graduates across the higher education sector.

In sum, while students demonstrated a generally positive academic self-perception, the noted deficiencies in learning strategies and problem-solving development call for targeted educational interventions. Addressing these areas is critical not only for enhancing students' immediate academic success but also for preparing them to meet the complex, evolving demands of health professions in the 21st century.

5.3.5. Students' Perception of Atmosphere (SPA)

The present study examined students' perceptions of the educational atmosphere using the Students' Perception of Atmosphere (SPA) subscale of the Dundee Ready Education Environment Measure (DREEM). The findings revealed that students from both public and private higher education institutions in Ethiopia reported moderately favorable perceptions, with mean scores of 29.54 and 28.62 out of a maximum 44, respectively. These scores fall within the interpretation category of "more positive than negative attitude," indicating that, overall, students perceived the educational environment to be reasonably supportive. These findings are consistent with earlier studies emphasizing that a positive educational atmosphere contributes significantly to students' satisfaction, motivation, academic performance, and well-being (J. Genn, 2001a; Pimparyon, 2000; Roff et al., 1997a).

The slightly higher SPA scores observed among public university students suggest a relative advantage in certain institutional factors that shape the educational atmosphere. Specifically, public institution students consistently reported better perceptions regarding the availability and adequacy of teaching and learning infrastructure, including library facilities, ICT resources, classroom environments, internet access, and practice areas for clinical learning. Previous research has shown that well-resourced learning environments play a critical role in promoting student engagement and academic achievement (Gruppen et al., 2019; Harden, 2005). Adequate infrastructure allows for more effective delivery of educational content, access to learning materials, and engagement in self-directed learning, all of which are crucial for the development of competent health professionals (Association, 1979; Cilliers et al., 2012)

The findings revealed that public universities in Ethiopia generally have better infrastructure compared to private universities, which corresponds with relatively higher student satisfaction levels at public institutions. In contrast, a study conducted in Punjab showed significant differences in student satisfaction between private and public universities, with private university students reporting higher satisfaction across all measured variables. Notably, the quality of infrastructure had the strongest impact on overall satisfaction among private university students, highlighting its importance as a key competitive advantage in that context (Dr. Paramjeet Kaur Mangat, 2025).

Furthermore, public university students reported more positive perceptions regarding the organization of academic schedules, fairness in timetabling, and clarity of academic assessments. This aligns with prior findings that structured and transparent academic management contributes to reduced student stress and enhances perceptions of institutional support (Artino, 2012; Kusurkar et al., 2011). Effective academic scheduling ensures equitable access to learning opportunities and clinical placements, thereby facilitating a more balanced and productive learning experience (Wilkinson et al., 2009).

However, despite the generally positive perceptions, both public and private institution students expressed concerns about fairness in grading practices. Although public university students rated this item somewhat more favorably, the perception of unfair grading remains a notable issue in both institutional contexts. Perceived grading unfairness has been associated with diminished student motivation, increased academic stress, and lower satisfaction with the learning environment (Bryan et al., 2005). Transparent, criterion-based assessment systems and regular feedback are essential to addressing these concerns and promoting trust in academic evaluation processes (Norcini & Burch, 2007; Schuwirth & Van der Vleuten, 2011)

The findings suggest that while the overall educational atmosphere in both public and private institutions can be characterized as more positive than negative, significant disparities remain, particularly regarding resource allocation, infrastructural support, and perceptions of assessment fairness. These areas warrant targeted attention from institutional leadership and policymakers. Investing in the enhancement of educational resources, particularly in private institutions, may contribute to narrowing the observed gaps and improving the educational atmosphere for all students (Education, 2013; Frenk et al., 2010a).

Moreover, ongoing monitoring of the educational atmosphere using validated instruments like DREEM can provide valuable feedback for continuous quality improvement. Faculty development programs focusing on fair assessment practices, student-centered pedagogy, and effective academic leadership may further strengthen the educational climate and foster a more equitable learning environment across the higher education sector (Gruppen et al., 2019; Steinert et al., 2006).

5.3.6. Students' Social Self-Perceptions (SSP)

The Students' Social Self-Perceptions (SSP) subscale findings from this study revealed that students from both public and private higher education institutions in Ethiopia held moderately positive views of their social well-being, with mean scores of 29.19 and 27.55 out of a maximum 40, respectively. These scores fall within the interpretive range of "not too bad," suggesting that while most students perceive their social environment as generally satisfactory, considerable room remains for improvement. This pattern is consistent with prior studies that have emphasized the importance of the social dimension of the educational environment in fostering student satisfaction, emotional well-being, and academic success (J. Genn, 2001a; Henning et al., 2012; Roff, 2005)

The slightly higher SSP scores among public university students suggest relatively better perceptions of social support and integration compared to students in private institutions. One possible explanation may be the greater availability of structured extracurricular activities, peer networks, and institutional traditions in public universities, which are often larger and more established (Soliman et al., 2017). These opportunities promote peer bonding, informal learning, and a sense of belonging, all of which are strongly associated with improved academic engagement and psychological well-being (Pitt et al., 2012; Wilcox et al., 2005).

Encouragingly, students across both institutional types reported positively on peer relationships, indicating that friendships and general social satisfaction were strong elements of their educational experience. Statements such as "I have good friends in this school" and "My social

life is good" received higher ratings, echoing the well-established role of peer support in reducing academic stress and promoting resilience among health sciences students (Dyrbye et al., 2006; Salamonson et al., 2012). Peer networks often serve as primary coping mechanisms, particularly in demanding professional education programs where shared experiences create solidarity and mutual support (Yeh et al., 2022).

However, despite these strengths, significant concerns emerged related to student support systems and clinical supervision, particularly among private institution students. Both groups expressed lower levels of satisfaction with statements such as "There is a good support system for students who get stressed" and "I receive the necessary clinical supervision." These findings resonate with numerous studies identifying insufficient institutional support for mental health and well-being as a persistent challenge in medical and health science education globally (Dyrbye et al., 2006; Rotenstein et al., 2016; Tian-Ci Quek et al., 2019). The highly demanding nature of health science programs, combined with limited counseling services, often exacerbates student stress, anxiety, and burnout, potentially compromising academic performance and future professional competence (Fares et al., 2016).

The deficiency in clinical supervision, particularly noted in private institutions, raises serious concerns given its central role in clinical education and patient safety. Adequate supervision ensures that students receive timely feedback, safe learning opportunities, and professional role modeling, all of which are critical for the development of clinical competence and professional identity formation (Hauer et al., 2014; Kilminster & Jolly, 2000). Inadequate supervision can lead to missed learning opportunities, skill deficiencies, and heightened anxiety among students entering clinical practice (Duvivier et al., 2011; Ramani & Leinster, 2008).

These findings underscore the need for institutional leaders and policymakers to prioritize the expansion and enhancement of student support services, particularly psychological counseling, stress management programs, and mentorship initiatives (Steinert et al., 2006; Yusoff, 2010). In addition, investment in clinical teaching faculty and supervisor training is essential to ensure that students receive high-quality clinical instruction and guidance. As highlighted by (Frenk et al., 2010a), health professional education systems must not only focus on knowledge and skill acquisition but also cultivate supportive, well-resourced learning environments that nurture students' personal and professional development.

In conclusion, while the overall social self-perceptions of students in both public and private health science institutions were moderately positive, significant deficiencies in student support systems and clinical supervision persist. Addressing these areas through comprehensive institutional reforms can contribute substantially to improving student well-being, reducing academic stress, and ultimately enhancing the quality of health science education in Ethiopia.

5.4. Students' Achievement Among Health Science Graduates from both Public and Private Higher Education Institutions (HEIs)

The present study revealed that the overall mean score of student achievement on licensure examinations among health science graduates from both public and private higher education institutions (HEIs) in Ethiopia was 48.98. This average, falling below the 50% threshold, indicates that many students did not achieve the minimum competency level typically expected for professional licensure and safe practice. Given that licensure examinations are designed to ensure that graduates meet fundamental standards of knowledge, skills, and professional readiness (Norcini et al., 2011; Yudkowsky et al., 2019), these findings raise significant concerns regarding the effectiveness of current health professional education programs.

5.4.1. Implications of Suboptimal Licensure Performance

Performance on licensure examinations serves not only as an individual measure of student competency but also as a proxy indicator of the quality of educational preparation provided by academic institutions (Case & Swanson, 1998). The suboptimal overall performance observed in this study suggests deficiencies in multiple facets of health professional education, including curriculum alignment, clinical training adequacy, faculty competency, and assessment practices. Prior studies have similarly linked poor licensure outcomes to systemic issues such as gaps in curriculum content, insufficient clinical exposure, and inadequately trained faculty members (Education, 2013; Frenk et al., 2010a; Zayyan, 2011).

Health professional curricula must be continuously updated to reflect evolving scientific knowledge, clinical practice guidelines, and national licensure examination blueprints (Gruppen et al., 2019; Harden, 2005). Misalignment between what is taught and what is assessed can compromise student readiness for licensure examinations and ultimately affect patient safety (Schuwirth & Van der Vleuten, 2011). Moreover, inadequate clinical practice opportunities limit students' ability to translate theoretical knowledge into practical competence a concern that has been widely documented in low- and middle-income countries, including sub-Saharan Africa (Mullan et al., 2011).

5.4.2. Institutional Differences: Public vs. Private HEIs

The observed difference in licensure examination performance between public and private HEIs is statistically meaningful, with graduates from public institutions outperforming their private counterparts ($M = 53.53$ vs. 44.52). This finding is consistent with previous studies reporting that institutional type and resource availability significantly influence student performance outcomes (Enarson & Cariaga-Lo, 2001).

Public HEIs in Ethiopia generally benefit from stronger governmental support, better-established academic infrastructures, more experienced faculty, and wider access to clinical training sites (Tsegaye, 2020). In contrast, many private HEIs face challenges such as limited faculty capacity, high student-teacher ratios, reduced clinical placements, and restricted access to advanced medical equipment (Education, 2013). These disparities may contribute to the performance gap observed on licensure examinations.

The greater variability in public HEI scores ($SD = 13.04$) compared to private HEI scores ($SD = 11.88$) suggests heterogeneity in educational quality even within public institutions, which may reflect differences in faculty expertise, student selection processes, and institutional leadership (Frenk et al., 2010). The positive skewness and slight kurtosis observed in both groups imply that while some high-performing students exist in both sectors, the majority of graduates cluster below the mean a concerning pattern that highlights systemic weaknesses in preparing the full spectrum of students to meet licensure standards (Schuwirth & Van der Vleuten, 2011).

5.4.3. Broader Systemic and Policy Considerations

The findings of this study resonate with the broader global discourse on health professional education quality, particularly in low-resource settings. The (Education, 2013) has emphasized the need for transformative health education that produces competent, responsive, and socially accountable health workers. Addressing the deficiencies identified in this study will require a comprehensive, system-level approach that includes:

- **Curriculum Alignment:** Ensuring that institutional curricula are mapped directly to national licensure examination content outlines and core competency frameworks (Gruppen et al., 2019; Harden, 2005; Tegegn, 2025).
- **Clinical Training Expansion:** Investing in clinical skills laboratories, simulation centers, and supervised clinical rotations to strengthen experiential learning (Issenberg et al., 2005; McGaghie et al., 2011).

- **Faculty Development:** Enhancing faculty qualifications through structured pedagogical training, mentorship, and continuous professional development programs (Ramani & Leinster, 2008; Steinert et al., 2006).
- **Standardization Across HEIs:** Implementing national accreditation standards and regular institutional audits to ensure uniformity in educational quality across both public and private sectors (Education, 2013).
- **Robust Assessment Systems:** Incorporating formative assessments and programmatic assessment models that provide continuous feedback and readiness checks before licensure exams (Norcini et al., 2011; Schuwirth & Van der Vleuten, 2011).

5.4.4. Conclusion

In summary, the suboptimal performance on licensure examinations identified in this study reflects both institutional and systemic weaknesses in health sciences education in Ethiopia. The statistically significant performance gap between public and private HEIs further underscores the need for national quality assurance mechanisms that monitor and regulate educational standards across all institutions. Without strategic reforms in curriculum design, faculty development, clinical training, and educational governance, challenges in licensure performance may persist and ultimately affect the competency of the healthcare workforce.

5.5. Relationship Between Educational Environment and Student Achievement

The present study revealed a strong and statistically significant relationship between the educational environment and licensure examination performance among health science students in Ethiopia. The Pearson correlation coefficient ($r = 0.582$, $p < 0.001$) indicates a moderately strong positive association, suggesting that students who experience more favorable educational environments are more likely to achieve higher scores on licensure examinations. This finding is consistent with a substantial body of literature underscoring the role of the learning environment as a key determinant of academic success in health professions education (J. Genn, 2001a; Gruppen et al., 2019).

The significant correlation observed aligns with the theoretical underpinnings of *social cognitive theory* and *constructivist learning theory*, which emphasize the importance of supportive and well-structured environments for fostering academic self-efficacy, motivation, and knowledge integration (Artino, 2012; Bandura, 1997; Schunk & Pajares, 2002). According to (Fraser, 2014), a positive educational climate enhances students' engagement, reduces academic stress, and facilitates effective learning, all of which ultimately contribute to better examination performance.

The regression analysis further demonstrated that both the DREEM score and institution type significantly predicted licensure examination outcomes, collectively accounting for 41.2% of the variance in exam scores ($R^2 = 0.412$; Adjusted $R^2 = 0.409$, $p < 0.001$). In educational research, this level of explained variance is considered substantial, particularly given the multifactorial nature of academic performance (Al-Natour, 2019). The standard error of estimate (10.18) suggests a reasonably accurate prediction of licensure scores based on the included predictors.

The positive predictive effect of the DREEM score highlights the central role of students' perceptions of their educational environment on licensure success. The DREEM inventory comprehensively measures essential elements of the learning environment, including teaching quality, academic self-perception, atmosphere, social support, and perceptions of teachers (Palmgren & Chandratilake, 2011; Roff et al., 1997a). Numerous previous studies have also demonstrated that a well-structured and student-centered educational environment fosters academic competence, clinical reasoning, and professional identity formation (Dornan et al., 2007; Schönrock-Adema et al., 2009).

In addition, institution type was found to have an independent positive effect on licensure outcomes, with students from public universities generally performing better than their counterparts from private institutions. This finding aligns with prior studies conducted in sub-Saharan Africa, which have documented systemic differences between public and private health science education providers in terms of faculty qualifications, clinical training opportunities, infrastructure, and academic governance (Frenk et al., 2010a; Greysen et al., 2011). Public institutions may offer more structured clinical rotations, better supervision, and access to broader patient populations, contributing to improved clinical competence and licensure success (Mullan et al., 2011).

From a systems theory perspective, the interplay between institutional resources, faculty capacity, curriculum design, and student support mechanisms collectively shapes student outcomes (Gruppen et al., 2019; Schuwirth & Van der Vleuten, 2011). Therefore, the significant predictive capacity of both DREEM scores and institution type reinforces the importance of holistic educational reforms that not only improve teaching quality but also address institutional disparities.

The findings also underscore the critical role that educational institutions play in preparing competent health professionals, particularly in resource-limited contexts. Improving educational environments through faculty development, curriculum alignment, student-centered pedagogy, robust clinical training, and enhanced support services can serve as strategic interventions to optimize student success and ensure that graduates meet the minimum competency required for professional licensure (Harden, 2006; Steinert et al., 2016).

5.5.1. Implications for Educational Practice

These results carry several important implications:

- Curriculum review and alignment: Programs should ensure that curricula are aligned with licensure competencies and standards to better prepare students for exams and practice (Harden, 2006; Mohammed et al., 2024).
- Faculty development: Continuous faculty training is crucial to strengthen teaching quality and clinical supervision (Steinert et al., 2016).
- Infrastructure improvement: Especially for private institutions, investments in clinical training sites, libraries, ICT, and simulation labs can directly enhance learning experiences (McGaghie et al., 2011).
- Student support services: Strengthening counseling, academic advising, and stress management resources can improve both academic performance and overall student well-being (Dornan et al., 2007; Schönrock-Adema et al., 2009).

In summary, this study provides strong empirical evidence that educational environment quality, as assessed by the DREEM inventory, is a significant predictor of licensure examination performance among Ethiopian health science students. Institutional type further contributes to differences in exam outcomes, suggesting the need for targeted institutional reforms to address disparities. Creating high-quality, student-centered educational environments is essential to improving licensure success and ensuring the competency of the future health workforce.

5.6. Challenges Faced by Graduates and Instructors

The thematic analysis of qualitative interviews with health science students and instructors across public and private higher education institutions (HEIs) in Ethiopia revealed a complex interplay of challenges and potential solutions that span multiple domains of the educational ecosystem. The findings underscore the multifaceted and systemic nature of barriers affecting the quality of health science education, aligning with prior literature that highlights similar structural and pedagogical challenges in low- and middle-income countries (LMICs) (Frenk et al., 2010a; Mullan et al., 2011).

5.6.1. Curriculum-Related Challenges and Recommendations

One of the central themes emerging from the interviews was the perceived mismatch between curriculum content and practical application. Students and instructors frequently reported that theoretical instruction did not adequately translate into clinical competence, a finding that resonates with the ongoing global discourse on competency-based medical education (CBME) (Frenk et al., 2010a; Gruppen et al., 2019; Tegegn, 2025). The misalignment between exit examinations and practical training further exacerbates this disconnect, potentially undermining graduates' readiness for professional practice. Moreover, participants highlighted the perceived irrelevance of freshman or foundational courses, which may contribute to disengagement and reduced motivation in early academic years a problem similarly reported in other resource-constrained educational contexts (Yudkowsky et al., 2019).

Curricular reform is thus urgently needed to better integrate clinical exposure throughout training and ensure alignment between learning objectives, assessments, and real-world practice needs (Harden, 2006; Schuwirth & Van der Vleuten, 2011). The adoption of spiral curricula, early clinical immersion, and problem-based learning (PBL) approaches may serve as effective strategies to bridge this theory-practice gap (Dornan et al., 2007; Mohammed et al., 2024).

5.6.2. Instructor-Related Challenges and Solutions

Instructors were identified as critical mediators of educational quality, yet several issues concerning teaching quality were reported. Inconsistent instructional delivery, poor time management, authoritarian teaching behaviors, and professional misconduct were common concerns. These findings echo previous studies from sub-Saharan Africa documenting variability in faculty competence and professionalism (Schönrock-Adema et al., 2009; Steinert et al., 2016).

Furthermore, the shortage of full-time and adequately qualified instructors remains a persistent challenge, exacerbated by faculty migration, inadequate professional development, and insufficient institutional investment (Frenk et al., 2010a; Mullan et al., 2011). Faculty development programs emphasizing pedagogical training, mentorship, and reflective practice are

crucial to improving teaching quality and faculty engagement (Gruppen et al., 2019; Steinert et al., 2016).

5.6.3. Institutional (Organizational) Factors

The analysis also identified several systemic organizational issues, including weak supervision and accountability mechanisms, profit-oriented institutional cultures (particularly in private HEIs), poor institutional planning, and insufficient student academic support structures. These findings align with institutional theory perspectives, which suggest that organizational culture, governance, and leadership profoundly shape educational outcomes (Kezar & Holcombe, 2017; Scott, 2013).

Profit-driven educational models, particularly prevalent in private institutions, may prioritize financial sustainability over academic rigor, resulting in compromised quality assurance processes (Altbach et al., 2019). Strengthening institutional governance, developing robust quality assurance frameworks, and fostering a student-centered institutional culture are critical to addressing these systemic gaps (Bassett & Maldonado-Maldonado, 2010).

5.6.4. Student-Related Factors

Student-level challenges also emerged prominently, with deficiencies in advisership, mentorship, learning strategies, academic integrity, and psychological support frequently cited. Similar patterns have been reported globally, emphasizing that students' academic and emotional well-being are key determinants of learning outcomes (Artino, 2012; Dornan et al., 2007; Dyrbye et al., 2006).

The absence of structured advisership programs undermines career orientation and academic decision-making, while weak ethical climates may foster academic dishonesty, a challenge that has been widely recognized in health science education (Zhao et al., 2024). Moreover, inadequate cognitive skill development and poor learning strategies may reflect insufficient emphasis on metacognitive training, critical thinking, and lifelong learning skills within the curriculum (Rivas et al., 2022).

Comprehensive student support systems incorporating academic advising, counseling, peer mentoring, and stress management programs are thus essential to promote both academic success and personal well-being (Dyrbye et al., 2006; Steinert et al., 2016).

5.6.5. Resource and Infrastructure-Related Issues

Finally, both students and faculty emphasized persistent resource constraints, including insufficient teaching and learning facilities, poor transportation arrangements for clinical placements, substandard campus amenities, and a lack of modern simulation equipment. These infrastructural deficits mirror long-standing challenges documented across health professions education (Frenk et al., 2010a; Mullan et al., 2011).

Access to adequate clinical exposure, functional libraries, internet connectivity, and simulation laboratories is critical for developing clinical competence, professional confidence, and patient-centered care skills (Issenberg et al., 2005; McGaghie et al., 2011). Investment in modern educational infrastructure should therefore be prioritized to enhance experiential learning opportunities.

5.6.6. Policy and System-Level Considerations

Finally, systemic and policy-level concerns emerged, including discrepancies between national policies and institutional practices, limited opportunities for postgraduate training, weak institutional accountability, and insufficient stakeholder engagement in educational policy development. These findings point to structural weaknesses in higher education governance and policy implementation (Scott, 2005).

Health workforce development in Ethiopia requires not only capacity-building at the institutional level but also more coherent national strategies that ensure regulatory oversight, transparent accreditation processes, and ongoing dialogue between policymakers, educators, and professional associations (Frenk et al., 2010a). Expanding postgraduate education opportunities is also essential for professional career progression and retention (Mullan et al., 2011).

Overall, the thematic findings of this study reflect the complex, interdependent, and systemic challenges that characterize health science education in the Ethiopian context. Addressing these challenges requires comprehensive, multi-level interventions that include curricular reform, faculty development, institutional capacity building, student support enhancement, targeted investment in infrastructure and national policy alignment. Without such systemic reforms, efforts to strengthen health workforce capacity may remain suboptimal, ultimately limiting progress toward national and global health goals.

Chapter 6: Summary of Key finding, Conclusion and Recommendations

6.1. Summary of Key findings and Conclusion

This comprehensive mixed-methods study offers robust and multifaceted evidence on the state of the educational environment, academic performance, and the complex challenges encountered by health science students and instructors within Ethiopian higher education institutions. By employing the Dundee Ready Education Environment Measure (DREEM), a rigorously validated and widely utilized tool, the quantitative component of the study assessed students' perceptions of their learning environment across multiple domains. The findings revealed that while students generally perceived their educational environment more positively than negatively, significant room for improvement remains, as the overall scores still fell short of the 'excellent' benchmark defined in the DREEM framework. Notably, public higher education institutions consistently outperformed their private counterparts across all subscales of the DREEM, including students' perceptions of learning, teachers, atmosphere, academic self-perception, and social self-perception. This suggests that public institutions may offer relatively stronger academic support structures, faculty engagement, resource availability, and campus climate.

Further supporting these institutional disparities, licensure examination performance data demonstrated that graduates from public universities achieved significantly higher mean scores compared to those from private institutions, highlighting the tangible academic consequences of variations in educational quality. These results underscore how institutional differences in educational environments can translate directly into measurable student performance outcomes on high-stakes, competency-based licensure assessments that serve as gateways to professional practice.

Critically, the study established a strong and statistically significant positive correlation between students' perceptions of the educational environment (as measured by the DREEM scores) and their licensure examination performance, with a Pearson correlation coefficient of 0.582 ($p < 0.001$). This strong association indicates that students who experienced more supportive, engaging, and well-structured educational environments tended to achieve higher levels of academic success on their licensure exams. Furthermore, linear regression analysis revealed that the combined influence of the DREEM scores and institution type explained 41.2% of the variance in licensure exam results a substantial level of explained variance for educational

research, emphasizing the critical role of learning environments and institutional factors in shaping student outcomes.

Complementing the quantitative data, the qualitative findings derived from thematic analysis of in-depth interviews offered valuable contextual understanding of the multifactorial challenges facing both public and private institutions. Students and instructors identified a broad range of systemic issues spanning curriculum misalignment with practical training, perceived irrelevance of foundational courses, inconsistency in teaching quality, inadequate clinical supervision, shortages of qualified full-time faculty, poor time management and scheduling conflicts, insufficient academic support systems, weak ethical cultures, low student motivation, and psychological stress. Additionally, institutional governance weaknesses, profit-driven priorities in some private institutions, inadequate infrastructure, transportation barriers for clinical placements, and misalignments between policy and practice further exacerbated the challenges confronting health science education in the country.

Taken together, these findings paint a comprehensive picture of the complex, interrelated factors influencing educational quality and student performance in Ethiopian health science programs. The results emphasize that addressing these challenges requires a holistic, system-wide approach that integrates curriculum reform, faculty development, effective institutional leadership, investment in infrastructure, and the establishment of comprehensive student support services. Such coordinated efforts are essential not only for improving educational quality and optimizing academic achievement but also for ensuring the development of a highly competent and ethically grounded health workforce capable of meeting the country's growing healthcare demands.

6.2. Recommendations

6.2.1. Curriculum Enhancement and Alignment

To improve educational outcomes and better prepare students for both licensure examinations and clinical practice, it is essential to revise and realign existing curricula. Curricular reforms should ensure that the content directly corresponds to licensure examination competencies and addresses real-world healthcare needs. This alignment will enable students to develop not only theoretical knowledge but also practical clinical competencies essential for effective professional practice.

In light of the strong qualitative evidence indicating that freshman courses are perceived as misaligned with health sciences training, it is recommended that first-year curricula undergo a systematic and evidence-based review. Courses that are weakly connected to professional health competencies should be either restructured, integrated, or phased out, while retaining foundational content that demonstrably supports clinical reasoning, communication, and ethical practice. General education subjects should be redesigned around discipline-specific learning outcomes and contextualized using health-related examples, case scenarios, and problem-based learning approaches. To enhance early professional socialization, selected introductory clinical exposures such as skills laboratory orientation, simulated patient interactions, and supervised observational placements should be embedded within the freshman year. Curriculum mapping and constructive alignment should be employed to ensure coherence between learning objectives, teaching strategies, and assessment methods across the program. Furthermore, curriculum reform processes should actively involve key stakeholders, including students, clinical instructors, curriculum experts, and healthcare employers, to ensure that revisions are responsive to workforce needs and national competency frameworks. Introducing competency-based curricula that emphasize problem-solving, critical thinking, clinical reasoning, and decision-making skills is crucial for fostering graduates who are prepared to function autonomously in complex clinical environments. Competency-based education models have been widely endorsed globally as effective strategies for preparing health professionals to meet evolving healthcare demands (Frenk et al., 2010a; Mohammed et al., 2024). Such reforms are expected to strengthen early learner motivation, reduce perceived curriculum overload, and establish a clearer developmental pathway toward clinical competence and successful performance in subsequent training phases and licensure examinations.

6.2.2. Faculty Development and Staffing

The quality of faculty remains a cornerstone of effective health science education. Institutions should establish comprehensive faculty development programs aimed at enhancing pedagogical competencies, promoting effective student engagement techniques, fostering professionalism, and strengthening faculty-student mentorship roles. Regular training in contemporary teaching methodologies, clinical instruction, assessment strategies, and feedback delivery should be prioritized to ensure continuous faculty growth.

Given the chronic shortage of qualified instructors, particularly in private institutions, targeted recruitment of full-time, highly qualified faculty members is essential to ensure teaching continuity and consistency. Furthermore, robust monitoring and evaluation systems should be established to hold instructors accountable for maintaining high standards of professional conduct, teaching quality, and ethical behavior, thereby safeguarding academic integrity and student satisfaction (Steinert et al., 2006).

6.2.3. Institutional Governance and Leadership

Institutional leadership and governance play a pivotal role in ensuring academic quality and organizational sustainability. Higher education institutions, especially private ones, should strengthen their institutional planning, organizational structures, and supervisory mechanisms to foster effective coordination and accountability. To safeguard educational quality and protect societal health workforce needs, it is strongly recommended that government regulatory bodies institute robust and routine auditing mechanisms that systematically assess the balance between financial surplus generation and academic reinvestment in private health professional colleges. These audits should go beyond basic financial compliance and explicitly evaluate whether institutional revenues are being adequately reinvested in core academic functions, including faculty recruitment and retention, instructional development, clinical training infrastructure, learning resources, and student support services.

Regulatory frameworks should require private institutions to demonstrate transparent allocation of financial resources toward educational quality indicators, such as student–instructor ratios, functionality of skills laboratories, availability of clinical placement opportunities, and outcomes on licensure and competency-based assessments. Institutions found to prioritize profit maximization at the expense of academic standards should face graduated regulatory consequences, including conditional accreditation status, enrollment caps, financial penalties, or suspension of licensure. Furthermore, public disclosure of audit outcomes should be mandated to

promote institutional accountability and inform student and stakeholder decision-making. Linking accreditation renewal and program expansion approval to verified academic reinvestment would incentivize private colleges to align financial strategies with national health workforce priorities. Collectively, these measures would help ensure that private sector participation in health professions education contributes meaningfully to educational excellence, ethical practice, and the long-term healthcare needs of society rather than short-term commercial interests.

Adopting shared governance models where faculty, students, administrators, and external stakeholders collaboratively participate in decision-making can enhance institutional transparency, responsiveness, and shared responsibility for educational quality. Effective leadership and participatory governance have been associated with improved institutional performance and stakeholder satisfaction in higher education globally (Kezar & Eckel, 2004).

6.2.4. Student Support Services

Robust student support systems are critical for promoting academic success and psychosocial well-being. Institutions should invest in expanding academic advising, mentorship, career guidance, counseling, and comprehensive mental health services to address students' personal, emotional, and academic challenges. Early interventions can mitigate stress, anxiety, and burnout common issues in health professional education and improve student retention and performance (Dyrbye et al., 2005).

Additionally, programs designed to strengthen students' cognitive skills, learning strategies, time management, and independent learning capabilities should be integrated into the academic environment to foster self-regulated learning and lifelong learning habits. Cultivating a strong ethical academic culture is equally important for addressing academic dishonesty, fostering professional identity formation, and instilling values of integrity, empathy, and social responsibility essential to health professions (Harden, 1999).

6.2.5. Resource and Infrastructure Development

Significant investment is needed to enhance the quality and accessibility of teaching and learning resources. Institutions should prioritize the development of state-of-the-art simulation laboratories, well-stocked libraries, reliable internet connectivity, and up-to-date information communication technologies to enrich students' learning experiences. Additionally, providing adequate transportation for clinical placements and upgrading campus amenities such as dormitories, cafeterias, and study spaces will contribute to a more conducive learning environment.

Efforts should also ensure equitable distribution of these resources across both public and private institutions, thereby minimizing disparities in educational opportunities and ensuring that all students receive high-quality training regardless of institutional type.

6.2.6. Policy and System-Level Reforms

At the national level, regulatory bodies must strengthen the enforcement of quality assurance frameworks to ensure uniform academic standards across all health science education providers. Accreditation processes should be transparent, evidence-based, and systematically applied to both public and private institutions.

Bridging the gap between national education policies and actual institutional practices requires more effective monitoring, implementation, and follow-up mechanisms. Stakeholder engagement should be institutionalized, involving educators, employers, professional regulatory bodies, policymakers, and student representatives in shaping and updating health science education policies to reflect the evolving healthcare landscape and workforce needs (Frenk et al., 2010a).

6.3. Practical Implications

6.3.1. For Institutions: Strengthening Internal Quality Assurance and Responsiveness

Higher education institutions must adopt systematic, evidence-based mechanisms to continuously monitor and enhance the educational environment. The use of validated tools such as the Dundee Ready Education Environment Measure (DREEM) provides a comprehensive framework for regularly assessing students' perceptions across multiple dimensions of the learning environment, including curriculum, faculty performance, institutional resources, and student support systems. Routine application of such instruments enables institutions to identify specific areas of strength and weakness, facilitating targeted interventions that directly address students' needs and enhance educational quality.

Furthermore, institutional leadership must foster a culture of responsiveness to student feedback, recognizing that students are key stakeholders whose lived experiences offer critical insights into the effectiveness of both academic and clinical training environments. By acting upon student feedback in a timely and transparent manner, institutions can strengthen trust, improve satisfaction, and ensure continuous improvement aligned with both educational and professional standards.

6.3.2. For Policymakers: Bridging Public-Private Sector Disparities and Strengthening Regulatory Oversight

The observed disparities in educational quality and licensure performance between public and private higher education institutions highlight an urgent need for policy-level interventions. Policymakers must develop comprehensive regulatory frameworks that not only ensure minimum academic standards but also provide supportive mechanisms to strengthen the capacity of private institutions without compromising quality. This may include offering technical assistance, incentivizing faculty development, and mandating periodic external quality audits to maintain accountability and protect student interests.

Moreover, strategic investments in educational infrastructure such as clinical simulation labs, libraries, and information technology as well as faculty development initiatives, are essential for building institutional resilience and enhancing national health workforce capacity. Strengthening institutional governance and accountability systems will also help ensure that both public and private institutions are aligned with national health priorities and international standards of health professions education.

6.3.3. For Students: Enhancing Academic Support and Professional Development

Students are central to the educational process, and targeted support systems are necessary to ensure their academic success, psychological well-being, and professional identity formation. Expanded academic advising, mentorship programs, and accessible counseling services can help students navigate academic challenges, manage stress, and develop resilience throughout their studies.

Additionally, enriched and competency-based curricula, supported by well-trained faculty, can foster the development of critical thinking, clinical reasoning, ethical professionalism, and self-directed learning all essential attributes of competent and compassionate health professionals. These enhancements will better equip students to meet both licensure standards and the complex demands of real-world clinical practice.

6.3.4. For the Health Sector: Building a Competent Health Workforce for National Health System Strengthening

Ultimately, improvements in the educational environment and student outcomes have direct implications for the broader health system. Graduates who are better trained, ethically grounded, and clinically competent contribute to improved patient care, enhanced service delivery, and stronger public health outcomes. Strengthening the educational pipeline ensures that the health sector is continuously supplied with professionals who possess not only the technical skills but also the interpersonal and ethical competencies needed to address Ethiopia's evolving healthcare challenges.

6.4. Limitations

This study has some limitations.

First, the sample size and institutional coverage may limit the generalizability of the findings to all health professional education programs in Ethiopian higher education.

Second, student outcomes may have been influenced by external factors beyond the educational environment, including personal and socioeconomic circumstances, which were not fully controlled.

Finally, constraints related to time, funding, and access to resources may have limited the scope and depth of data collection and analysis. Despite these limitations, the study provides contextually relevant insights into key challenges within health professions education.

6.7. Future Research Recommendations

Building on the current findings, future research should:

1. Conduct Longitudinal Studies:

- Track students over time to assess how changes in educational environment affect long-term academic and professional outcomes.

2. Evaluate Interventions

- Test the impact of specific reforms such as curriculum changes, faculty development, or student support enhancements on student outcomes.

3. Expand Stakeholder Perspectives

- Incorporate viewpoints from employers, clinical preceptors, health administrators, and patients to create a more holistic understanding of educational quality.

4. Compare Cross-Nationally

- Conduct comparative studies with other countries facing similar challenges to identify scalable best practices.

5. Broaden Qualitative Inquiry

- Use larger, more diverse interview samples to capture a broader range of institutional and cultural factors shaping educational environments.

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Annex

Annex 1: Questionnaire

Information sheet and informed consent

This informed consent and information sheet is prepared for final year students at AAU, who we are inviting to participate in research entitled “**Health Professionals’ Education in Ethiopia: A comparative study of Public and Private Higher Education Institutions**”.

Name of the principal investigator & organization: Yenuse Molla, Addis Ababa University

Introduction and purpose: Good morning/Good afternoon! I am _____ from Addis Ababa University and I am a data collector for assessing the “Health Professionals’ Education in Ethiopia: A comparative study of Public and Private Higher Education Institutions using DREEM inventory tools”. I am very happy to inform you that, you are one of eligible participants and you are very welcome to take part in this study. During the data collection time, you will be asked to read the questions below (DREEM inventory tool) and give your responses to questions related to Students perception of Learning, Students perception of Teachers, Students academic perception, Students perception of atmosphere, and Students social self-perceptions. It may take approximately 20 minutes to complete all tasks.

Your privacy will be protected by the researchers throughout the study. All information you supply will be kept confidential and used for research purposes only. If you don’t agree to participate, you can withdraw participation at any time without penalty. This research project is approved by the College of Education and Behavioural Science Ethical Review Board, Addis Ababa University. It is believed that the result of this study will be significant in finding solutions for the challenges of associated with health professionals’ education environment in Ethiopia.

Legal Rights and Signatures: I have been asked to give my consent to participate in this research study. I have read the foregoing information. I consent voluntarily to participate in the study with my signature below.

Name (participant) -----Signature -----Date -----

Name (data collector) -----Signature -----Date -----

If you have any questions, you may ask now/ later, for more detail you can contact:

Mr. Yenuse Molla (PI): Address: Addis Ababa University, Addis Ababa, Ethiopia. E-mail: molayen@gmail.com, Mobile No. +251911178887

Thank you for your cooperation!

Data Collection Tools

I. Personal Information (✓ in space provided & in table under field you choose accordingly)

1. Sex: M_____ F_____
2. Year of Study: - _____
3. Name of institution: _____
4. Field of study: _____
5. Entrance exam result: _____
6. cGPA: _____
7. Current attachment ward: - Internal medicine_____ Surgery _____ GYN/OBS_____ Pediatrics _____

II. Dundee Ready Education Environment Measure (DREEM) inventory tools

S.No	STATEMENT	strongly agree	agree	unsure	disagree	strongly disagree
	Students' perception of Learning:					
1.	I am encouraged to participate in the class					
2.	The teaching is sufficiently concerned to develop my confidence					
3.	The teaching encourages me to be an active learner					
4.	The teaching is well focused					
5.	The teaching is often stimulating					

6.	The teaching time is put to good use					
7.	The teaching is student-centered					
8.	Long term learning is emphasized over the short term					
9.	The teaching is too teacher-centered					
10.	There are adequate skill lab (demonstration) practice sessions					
11.	I am clear about the assessment procedure of the courses					
12.	I am getting adequate exposure for clinical skills expected of me					
	Students' perception of Teachers:					
13.	The school has adequate and qualified instructors					
14.	The teachers are good at providing feedback to students					
15.	The teachers have good communication skills with patients					
16.	The teachers are knowledgeable					
17.	The teachers give clear examples					
18.	The teachers are well prepared for their classes					
19.	The teachers provide constructive criticism here					
20.	Teachers inspire the students					

21.	The teachers get angry in class/practical site					
22.	The teachers are authoritarian					
23.	Teachers have adequate skill in clinical skill teaching					
	Students' academic perception:					
24.	Much of what I have to learn seems relevant to a career in my profession					
25.	I feel I am being well prepared for my profession					
26.	My problem-solving skills are being well developed here					
27.	I am confident about passing exit/licensure exam					
28.	I have learned a lot about empathy in my profession					
29.	I am comfortable with the learning strategies being used					
	Students' perception of atmosphere					
30.	The school has good teaching-learning facilities (Library, ICT room, classroom, internet and other)					
31.	The practice areas are conducive for learning					
32.	There are opportunities for me to develop interpersonal skills					

33.	I feel able to ask the questions I want					
34.	The atmosphere motivates me as a learner					
35.	I am able to concentrate well for my education					
36.	The atmosphere is relaxed during the class/practical site teaching					
37.	This school is well timetabled					
38.	Cheating is a problem in this school					
39.	I find the experience disappointing					
40.	Unfair grade is a problem in this school					
	Students' social self-perceptions:					
41.	I have good friends in the school					
42.	There is a good support system for students who get stressed					
43.	I am enjoying with this program					
44.	I am rarely bored on the courses					
45.	I get support from other practitioners in practice sites					
46.	My accommodation is pleasant					
47.	My inter-professional communication is smooth					

48.	My social life is good					
49.	I occasionally feel lonely					
50.	I receive the necessary clinical supervision					

III. Additional information

1. Do you think further discussion is needed to address points not raised in this tool? Yes_____ No_____
2. Do you think factors affecting your educational environment quality will be solved through discussion? Yes__ No__
3. What are the major factors that affect educational environment in your setup?

Annex Two: Qualitative Interview guide questions

Introduction:

Welcome to the interview! I appreciate your willingness to participate in this research study on 'Health Professionals' Education in Ethiopia: A Comparative Study of Public and Private Higher Education Institutions.' The purpose of this study is to gather insights and perspectives from individuals like yourself who have experience in the field of health professionals' education in Ethiopia.

Your valuable input will contribute to our understanding of the similarities and differences between public and private higher education institutions in Ethiopia regarding the education and training of health professionals. The aim is to identify strengths, challenges, and potential areas of improvement in the educational landscape.

I assure you that all information shared during this interview will be treated with the utmost confidentiality and used solely for this research study. Your responses will be anonymized, and no identifying information will be included in any publications or reports resulting from this study.

Please note that participation in this interview is entirely voluntary. If at any point you feel uncomfortable or wish to withdraw from the interview, please let me know, and I will respect your decision without any consequences.

During the interview, I will be asking you a series of questions related to your experiences, perspectives, and observations regarding health professionals' education in Ethiopia. Your insights and opinions are highly valued, so please feel free to provide detailed and honest responses.

If you have any questions or concerns about the study, the interview process, or the information I will collect, please do not hesitate to ask. I am here to ensure that you have a positive and meaningful experience participating in this research.

Once again, thank you for your participation and for sharing your expertise. Your contribution will help inform policies and practices in health professionals' education in Ethiopia, ultimately aiming to enhance the quality of education and training in the field.

Now, let's proceed with the interview. I will begin by asking questions about your background and experiences, followed by specific topics related to health professionals' education in Ethiopia. Please take your time to provide thoughtful and detailed responses. Feel free to ask for clarification whenever needed. I greatly appreciate your time and input!

For Students:

1. Can you please introduce yourself and provide some background information about your experience as a health science program graduate?
2. Did you attend a public or private higher education institution for your health science program? Can you share your experiences regarding the challenges you faced during your education?
3. What were the key challenges you encountered during your education in the health science program? How did these challenges impact your performance?
4. How do you perceive the differences, if any, between the challenges faced by students in public and private higher education institutions?
5. Were there any specific challenges related to the curriculum or teaching methods in your health science program based on the type of institution you attended?
6. Can you elaborate on any differences you noticed in terms of resources and facilities available to students in public and private higher education institutions? How did these differences impact your education and performance?

7. Did you face any challenges related to the reputation or recognition of the institution you attended? How did this impact your career prospects?
8. In your opinion, what measures or strategies could be implemented to address the challenges faced by health science program graduates in both public and private higher education institutions?
9. Is there any additional ideas you want to add?

For Instructors:

1. Can you please introduce yourself and provide some background information about your experience as an instructor in the health science program?
2. Have you taught in both public and private higher education institutions for health science programs? Can you share your observations regarding the challenges faced by students in these institutions?
3. From your perspective, what are the key challenges that health science program graduates face in public and private higher education institutions?
4. What differences, if any, have you noticed in terms of the challenges faced by students in public and private higher education institutions?
5. Are there any specific challenges related to the curriculum or teaching methods based on the type of institution students attend for their health science program?
6. Can you elaborate on any differences you have observed in terms of resources and facilities available to students in public and private higher education institutions? How do these differences impact student performance?
7. Have you noticed any differences in terms of the reputation or recognition of health science programs between public and private higher education institutions? How does this impact the career prospects of graduates?
8. In your opinion, what measures or strategies could be implemented to address the challenges faced by health science program graduates in both public and private higher education institutions?
9. Is there any additional ideas you want to add?

For Other Stakeholders (administrators, employers, etc.):

1. Can you please introduce yourself and provide some background information about your role in the health science field?
2. Have you worked with health science program graduates from both public and private higher education institutions? Can you share your observations regarding the challenges they face?
3. From your perspective, what are the key challenges that health science program graduates face in public and private higher education institutions?
4. What differences, if any, have you noticed in terms of the challenges faced by graduates from public and private higher education institutions?
5. Are there any specific challenges related to the curriculum or teaching methods in health science programs based on the type of institution graduates attended?
6. Can you elaborate on any differences you have observed in terms of resources and facilities available to graduates from public and private higher education institutions? How do these differences impact their performance?
7. Have you noticed any differences in terms of the reputation or recognition of health science programs between public and private higher education institutions? How does this impact the career prospects of graduates?
8. In your opinion, what measures or strategies could be implemented to address the challenges faced by health science program graduates in both public and private higher education institutions?
9. Is there any additional ideas you want to add?

Annex 3: Ethical Clearance

Ref: CEBS_IRC_CCEPS_002/2024
Date: January 12, 2024

COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES
ADDIS ABABA UNIVERSITY
CEBS's INSTITUTIONAL REVIEW BOARD (IRB)
Ethical Approval Certificate
Graduate program students

Form: CEBS_IRC_Template_Form_002

IRC Approval Reference No.: CEBS_IRC_CCEPS_002/2024	
To: <u>Yenuse Molla</u> Principal Investigator, (Health Professionals' Education in Ethiopia)	
From: Teshome Nekatibeb (PhD), Chair, Center for Comparative Education and Policy Studies	
Re: Approval of a Research Ethics	
Protocol Title	PhD Dissertation Project (Health Professionals' Education in Ethiopia: A comparative study of Public and Private Higher Education Institutions)
Protocol Number	CEBS_IRC_CCEPS_002/2024
Principal Investigator	Yenuse Molla
Institute	Center for Comparative Education and Policy Studies
Study Site(s)	Addis Ababa University, Hawassa University, Rift Valley University and Africa Medical College
Decision	<i>All ethical standards are found to be met. Hence, the Center Ethical Review Committee has approved this research project.</i>
Date the approval was issued	January 12, 2024
Expiry of this approved certificate (Not exceeding 2 years)	Valid for two years

Additional notes (If any) to the PI.
CCEPS has established that this research fulfills all ethical requirements to be conducted in both countries.

Remark: *(Information on what has to be fulfilled after approval)*

- _____ Data collection will be conducted following the approval.

• _____

Signature: _____

Date: _____

15/01/2024
For Academic Unit
Head/Graduate program



Signature: _____

Date: _____

For CEBS-IRC

