Quantifying the Education Gap and Student Dropout Rate in Yemen: A Decade-Long Analysis of Secondary School Performance and University Admission Outcome

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Abstract— The prolonged crises in Yemen over the past decade have severely affected students' education quality, raising concerns regarding the sharp decline of primary and secondary education quality and its potential long-term consequences. This study explored the education gap and students' dropout rate at the pre-university stage, while also addressing the multifaceted challenges students face during transition into higher education, the underlying causes, and ways to control them. This research adopted a quantitative approach by analyzing data from approximately 13,000 high school graduates across various Yemeni governorates over the past decade. The study traced students' educational trajectories by comparing secondary schools' final grades with university admission exam outcomes and again with the Ministry of Higher Education and Scientific Research (MHESR) admission exam results, which have been conducted since 2022 to evaluate their eligibility for international scholarships. This multi-analysis represents a systematic quantification of the education gap at both the governorate and national levels. A unique finding reveals a substantial education gap of approximately 27% on average between secondary education outcomes and the actual scientific level of pre-university students across Yemeni governorates. This education gap narrows in large urban governorates and widens in rural and countryside areas. The analysis precisely quantifies, for the first time, a 46% dropout rate among secondary school graduates, indicating that nearly half of the Yemeni youth enter the workforce without proper qualifications. Through a data-driven, analytically grounded assessment, this study contributes valuable insights that can assist education policymakers in designing more effective strategies to improve the quality of primary and secondary education in Yemen and foster a more stable and sustainable educational environment for Yemeni students.

Keywords— *Education in Yemen; Student Dropout Rates; Educational Challenges; War-affected Area; Education Gap.*

1. INTRODUCTION

Education functions as a continuous chain in which weaknesses at one stage can affect the subsequent stages. The quality of primary and secondary school education is essential to obtaining good higher education outcomes and good placement opportunities in the labor market [1, 2]. Therefore, governments and societies invest heavily in education and work hard to meet their needs. They also carefully plan to update curricula and infrastructure to align with technology and market requirements. Some wealthy countries even offer regular financial incentives to students to encourage continued learning and effective qualifications. At the same time, they closely monitor dropout rates in schools and universities and take timely action to address obstacles that may hinder students' education and preparation for the future.

Education challenges are usually escalated in poor or unstable countries, where a lack of dedicated funding and official support leads to underdeveloped systems [3]. As a result, generations may emerge without the knowledge and skills necessary for the future [4]. Indeed, education continuity during wartime provides physical, psychological, and cognitive protection that sustains our lives and offers a sense of hope for the future [5]. The extent of a country's recovery after war is closely connected to the strength of its education system. Countries whose education systems collapsed during wartime often struggle to recover and restore stability, while those that preserved their education systems tend to recover more effectively [4-6].

Frequent studies investigating war-affected countries provide detailed insights into how crisis and instability deteriorate education systems and underline how education was exploited for political purposes [4]. However, such studies often do not compare findings across different contexts. Recent research on education in Yemen showed a rapid decline in both secondary and higher education due to the ongoing war, indicating how education has been used for political purposes and regional conflicts [5-7]. It also highlights local and community-based efforts to renew infrastructure, redesign curricula, and adapt new technology [8]. Critical studies further linked the breakdown of education, especially for girls, with weaker chances for long-term peace and stability [5, 9]. In a conflict-affected country, recent research in Sudan indicates that the recent crisis contributes to the collapse of official education systems and the growth of small, community-based networks [10]. Similarly, studies on Syria describe the development of a two-level, privatized education system and how education is used to strengthen political control [11-13]. Research on refugee education in Bangladesh shows that while community-led initiatives are important, they often face challenges in expanding and gaining official recognition [14]. In war-affected areas, students and educational institutions benefit from technology and electronic facilities such as online courses, social networks, and generative artificial intelligence tools for enhancing their academic attainment [15, 16].

Common evidence from literature on conflict-affected countries demonstrates that political crises are directly linked to the collapse of the education system and long-term instability. Furthermore, the collapse of education systems in war-affected countries leads to the emergence of disparate educational systems that follow political agendas or community-based networks. These independent small

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education systems lack official recognition, which is also a common case in the Yemeni context.

Population displacement due to the wars contributes negatively to leaving schools and universities, while the poor socioeconomic situation transforms education into a secondary priority for families [9]. Common features of conservative society, such as cultural norms, religious beliefs, and social customs, are fundamental factors that greatly influence enrollment rates in education and job opportunities, especially for females [17]. It was emphasized that the adoption of large-scale UN programs to meet people's economic and psychological needs in war-affected areas effectively mitigates conflict and improves social cohesion [18].

Higher education institutions (HEIs) primarily admit high school graduates, considering their chosen educational tracks, such as the literary, scientific, vocational, or commercial paths. Each university sets specific entry standards for different programs, which may include high school grades, proficiency in foreign languages, computer skills, and other relevant abilities. In some special circumstances, HEIs adopt admission tests, specific skills, and sometimes structured interviews, based on the chosen specialization and field. These HEIs' additional requirements are often implemented in countries with weak primary and secondary education systems, where students may achieve extremely high grades that do not accurately reflect their true academic abilities.

Overall, education systems in war-affected environments are shaped by many external factors, including the country's economic growth, political stability, family income levels, and the broader environment surrounding schools and HEIs. These external influences forced educators to develop new and specific metrics to assess the performance and the quality of graduates, creating a dynamic and complex process, as seen in the case of Yemen. This highlights the urgent need for conducting this comprehensive research, which intends to study the transitional stage between high school and university education. It closely examines how both external and internal variables influence the performance of students at the pre-university stage in Yemen, as well as the quality of student preparation provided by primary and secondary education.

2. Education in Yemen

For decades, higher education in Yemen has suffered from poor infrastructure, lack of budgets, and lack of specialized teaching staff [18]. However, great destruction of education systems and their infrastructure has occurred in the last decade due to the ongoing crisis since 2015 [5-9]. On the ground, the country's educational system was split into two independent systems because of the political and geographical division caused by the war [9, 17, 18]. This catastrophic situation in public schools and HEIs has coincided with the rapid establishment of hundreds of public and private schools and universities across Yemen, often without adhering to official standards, such as infrastructure, laboratories, facilities, and teaching staff [8]. This abnormal situation created educational inefficiencies and affected the quality of graduates in all educational phases.

It is accepted that civil wars and their consequences have negatively affected the social and financial situation of Yemeni families and caused the displacement of thousands of Yemeni families from war zones, losing their housing and livelihoods and transforming their priorities in struggling to provide the life necessities for their families. Accordingly, education is no longer a priority but has become a secondary option for these families [9]. In addition, the war in Yemen has created new geographical borders and checkpoints that have hindered the free movement of citizens and students and doubled their transportation fees, contributing to students' attrition from university education to the local and regional labor market without proper qualifications.

Despite the harsh conditions mentioned above, many Yemeni families still see education for their children as a top priority, and they make key efforts for their children's educational continuation. Therefore, Yemeni schools and HEIs, public and private, are still full of students. However, students in high school, pre-university, and university require an in-depth evaluation of their academic performance under these catastrophic circumstances. Research studies that explored in depth the situation of students in Yemen during the transitional phase between high schools and university are almost nonexistent [7-12]. Additionally, investigating the situation of students in Yemen during this essential stage in a comprehensive manner across the entire Yemeni geography is not abundant. Therefore, this research sheds light on the true academic levels and situations of high school graduates before enrolling in HEIs in the last ten years (2015-2025), a period marked by wars and instability.

3. Research Gap

The transition from secondary to university education in Yemen represents a distinct and challenging phase within the Yemeni education system. This is primarily due to weak coordination between the two educational systems and the absence of effective strategic planning by educational authorities. Accordingly, most students in Yemen typically spend an additional academic year in this transitional stage to strengthen their academic foundations and better identify their personal aptitudes before choosing a suitable field of study. This extension transition reflects underlying deficiencies in primary and secondary education. Nevertheless, in recent years, many private universities have begun admitting students directly after they complete secondary education.

The pre-university stage is a critical period during which youth make key decisions about their professions and aspirations. The decisions young people make during this critical and short period determine the country's future development directions through the common fields of study they choose. Therefore, governments place considerable emphasis on this stage, implementing strategic planning and policies to guide students toward priority disciplines that align with national needs.

Many attempts have been made to assess the quality of primary and secondary education in Yemen. However, most of these efforts focus on examining internal school processes, teacher quality, and the impact of the ongoing war on school education. This research offers a unique perspective by examining the quality of primary and secondary education through its outcomes and their relevance to university education.

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4. Research Methodology

This study implemented a quantitative approach to address students' challenges by evaluating the quality of primary and secondary education and focusing on the challenges students face in the post-secondary stage. The study relied mainly on secondary data collected from public and private universities during 2016-2025; the Ministry of Higher Education and Scientific Research (MHESR), Aden; and literature studies. This data constitutes different types of data at more than one stage and is organized in Table 1.

Table 1: Secondary data details for research and relevant educational Institutes.

S. No.	Educational Institute	Sample Size (Students)	Executing Year	Data Details
1	Sana'a, Taiz, & Ibb Universities (Engineering Faculty & IT)	4700	2016-2023	Secondary School Final Grades and University Admission exam results.
2	MHESR, Yemen (Aden & Sana'a) all Disciplines	6000	2022-2024	Secondary School Final Grades and the Ministry Admission exam results.
3	Al Janad University (Engineering Faculty & IT)	240	2018-2022	Secondary School Final Grades and University overall grades.
4	Taiz University (Engineering Faculty & IT)	2500	2016-2024	Secondary School Grades, Admission exam results, and University overall grades.
5	Literature Review Data		2000-2025	

1) The overall grades of high school graduates were compared with the results of the university admission exams at 3 public universities, namely Sana'a, Taiz, and Ibb Universities, during the years 2019 to 2023. The sample included 4700 high school graduates who passed admission exams at the three universities. The sample was selected based on official data related to engineering colleges of the prescribed universities.

2) Critical data was officially collected from the MHESR, Aden. The selected sample was limited to top-performing high school graduates from 15 Yemeni governorates, including 2022 and 2024 graduates, who passed the ministry evaluation exams conducted to examine their eligibility for international educational scholarships within the MHESR in Aden. A sample size of about 6000 students from more than 15 different governorates who attended these exams was selected. Thereafter, the high school overall grades of each participant were compared with the MHESR evaluation exam results for two different batches. These large-scale data, after being analyzed statistically, reflected the exact scientific level of primary and secondary education within each governorate in Yemen and estimated the gap between secondary education output and the requirements of university education. This analysis can be treated as accurate because the evaluation exams conducted by the MHESR were standardized for all students across all Yemeni governorates, making the comparison fair and logical.

3) Detailed data was collected in several stages from the Faculty of Engineering and Information Technology, Taiz University (2500 students), and Al-Janad University of Science and Technology (240 students). The scientific level of these students was studied and compared in three main stages. It compared students' overall grades with their scores in admission examinations and then their university overall grades after graduation. This volumetric comparison involves students from different engineering and computer disciplines through the three stages.

4) Other secondary data was collected from the MHESC in Aden and Sana'a on the inputs and outputs of university education to obtain the real dropout rate between the two stages.

5) Miscellaneous data collected from previous research studies and from official and unofficial bodies that have referred to the topic.

Various and multiple research data were analyzed using Microsoft Excel software and statistically using the SPSS program. The results were presented in the form of charts, tables, and diagrams to simplify data presentation. The findings were then interpreted and linked to the current situation during the period 2015-2025 studied.

5. Results & Discussion

In this section, detailed results obtained from data analysis and optimization are presented and interpreted. That is to describe the actual situation of high school graduates in Yemen during wartime. The results are divided into several main subsections, presented, and discussed simultaneously.

5.1 The Gap Between High School Outcomes and University Education

The quality of HEIs is fundamentally affected by the quality of primary and secondary education [1]. Frequent official, research, and international reports agree that there is a wide gap between the secondary school education outputs and the requirements of university education inputs. However, studies in Yemen to systematically measure this gap are not presented. This study offers a real analysis to identify this gap in Yemen, in general, and at the level of each state, exploring its root causes and ways to address them.

Primary and secondary education have been deliberately neglected for decades, but the decade-long ongoing war has worsened. Most high school students have scored higher grades than their original grades. However, the students' real qualifications and educational level are weak and do not meet the minimum requirements for university education. This large gap in qualifications represented great challenges for all

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relevant parties: (1) for parents and family, who struggle to arrange an additional qualification for their relative students to enhance their educational level before they enroll in university education; (2) for higher education institutions (HEIs), who exert double efforts to raise the level of students quickly to the desired university level; and (3) for the students themselves, who find themselves in the midst of a weak educational system that caused them a lot of additional psychological troubles and stresses, which are not common in other stable societies and countries.

The challenges facing university education institutions in this context are large and complex. High school graduates may enroll in universities with extremely high overall grades, most of which exceed 90%, but with poor understanding and academic achievement. Confidence and dependence on secondary school overall grades have weakened or been lost in higher and vocational education institutions.

Figure 1 shows the size of the educational gap between the high school and the actual level outputs. This analysis is crucial and logical, supported by these reasons: (1) The test was standardized for all the samples studied by the governorates. (2) The sample included the top-scoring 50 students in secondary school and the MHESR level-identification exams. (3) The sample included samples from almost all governorates in Yemen. (4) The whole selected sample of students was given equal preparation time before conducting the MHESR level-identification exams so that students were supposed to give their best.

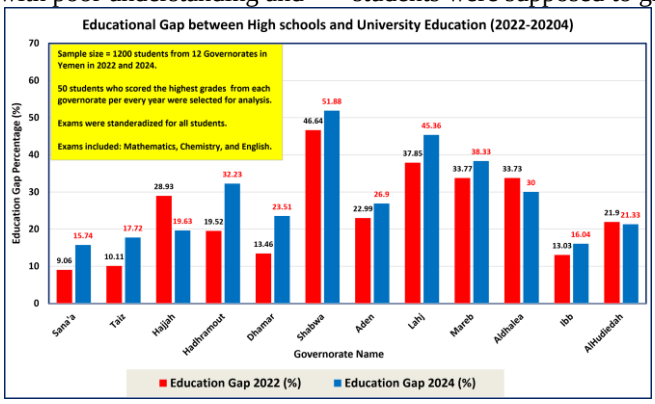


Figure 1: A chart showing the results of education gap analysis between high school overall grades and the MHESR level-identification exams for the top 50 students who scored the highest overall grades in each governorate between 2022 and 2024. Exams were conducted in Mathematics, Chemistry, and English.

The percentage values in the graph (Figure 1) represent the average difference between the overall grades of high schools and MHESR Level identification exams for the batch of 2022 and 2024. Large values in the graph indicate large gaps and inefficiencies in the education system, while small values indicate short gaps and slightly better performance.

The results demonstrate a large disparity in the gap starting from the capital, Sana'a, with a gap that is 9.06% in 2022 and 15.74% in 2024. Taiz Governorate comes second, with a gap of 10.1% in 2022 and 17.72% in 2024. These findings indicate that primary and secondary education in large cities had better education quality than in rural cities, except for Aden governorate, which is a large city with high educational gaps of 23% and 26.9% in 2022 and 2024, respectively.

On the other hand, Shabwa governorate recorded the largest educational gap, reaching about 46.66% and 51.88% in the analysis of 2022 and 2024, respectively. Undoubtedly, these results indicate that the primary and secondary education system in Shabwa Governorate is the most inefficient in the country. These percentages vary based on the quality of the education system in each state. Furthermore, Lahj, Mareb, and Aldhalea have a high education gap, more than 30%. These results should represent a warning indicator to local authorities in these provinces to plan carefully to improve the quality of education systems.

Overall, cumulative results from Figure 1 also show that the overall gap between the high school and MHESR level identification exams was about 24.5% for the 2022 batch graduates and expanded to approximately 28.22% for the 2024 batch. Thus, the overall country-based educational gap between high school final grades and their true level in Yemen is 26.36%. This large gap is a key measure of the quality of secondary education in the country and in each governorate. The large gap indicates that students who obtain a high school GPA have an actual academic level that is 26.36% lower than their official grades in secondary school education.

This study concluded that there is a wide education gap of about 27% between high school students' output and their actual level. What confirms the reality of this gap is that it studied a sample of the top 50 students from each governorate for several years and conducted a standardized exam based on official data from the MHESR. As shown in Figure 1, this gap varies based on urban and rural divisions. It shows short gaps in large urban cities, such as Taiz, Sana'a, and Ibb. Aden governorate is the exception, with an education gap of 25%, larger than in other urban areas. The remote and rural governorates recorded frightening gap percentages, such as in Shabwa, followed by Lahj, Al-Dhali, and Marib. These results provide a clear picture of the situation of primary and secondary education in the Republic of Yemen in general and in detail in each governorate. The study urges the government to realize the danger of this widening education gap for Yemen's future and to effectively utilize all available resources to systematically mitigate it to a normal rate.

The education gap is also measured using another reliable data analysis. Figure 2 illustrates another approach addressing the size of the education gap determined earlier, but with another large-scale sample being collected from the admission exam results of engineering colleges at three public universities over several years. The analysis aimed to

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obtain the average overall grades for each batch from each university separately, and then numerically calculated the average difference between the overall grades of high schools and the university admission exam. In this context, the findings of Figure 2(a) show that the average scores on admission exams at Ibb University are the lowest, reflecting students' reluctance to study engineering disciplines and emphasizing the poor quality of secondary education in the governorate. More importantly, the findings of Taiz University's admission examinations are higher than those of Sana'a University and Ibb University, indicating that the education system in Taiz Governorate is slightly better than those in Ibb and Sana'a Governorates.

For a more reliable analysis, large-scale data from the engineering college of Taiz University, collected between 2016 and 2024, were analyzed and interpreted. The results in Figure 2(b) indicate that the education gap in Taiz Governorate is 18.17% on average, which aligns reasonably well with the MHESR admission exam results for students from Taiz Governorate.

The combined results of the average gap between the high school grades and the university admission in the three universities studied for a period of five years implied that the average educational gap is at 27.56%, which is fully consistent with the results shown in Figure 1, based on the examination results conducted by MHESR, Aden, for students who scored the highest grades in the secondary schools for each state.

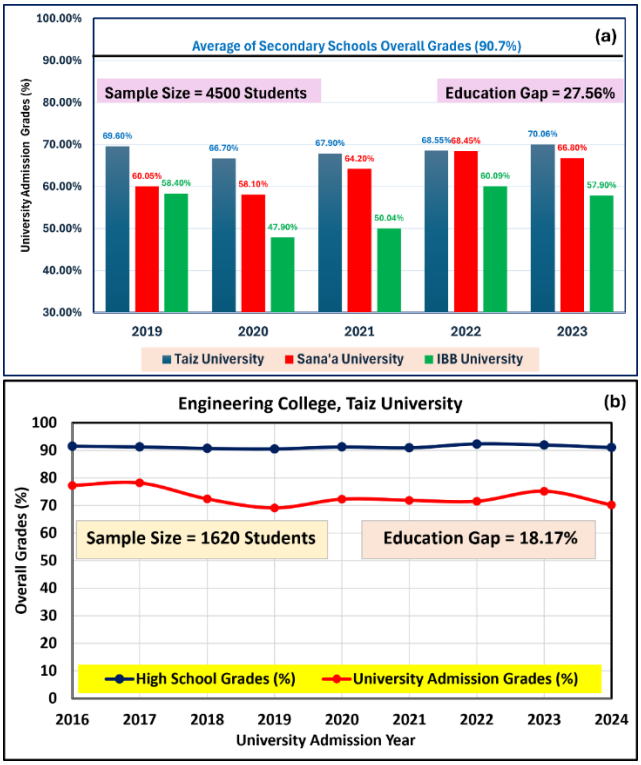


Figure 2. Curves and charts represent a sample of Yemeni students to compare the overall grades between high school and engineering colleges' admission exam results conducted for them before enrolling in university education. (a) A selected sample represents the whole of Yemen between 2019 and 2023, and (b) a selected sample represents Taiz Governorate between 2016 and 2024. Exams were conducted in mathematics, physics, and English.

Together, these two types of analysis show that there is an education deficiency of about 27% between actual primary and secondary education and the requirements of university admissions. In general, all the analysis in this research in all its details leads to an important conclusion: Primary and secondary education in Yemen suffers from a serious imbalance and needs radical and deep treatments to restore the growth curve to a normal rate. This large gap causes fundamental challenges for the Yemeni family, so it bears the costs of rehabilitating its fresh students in costly private institutions to improve their level before and during their admission into university education. It also caused serious challenges for students when they enroll in university education, as they are shocked by their true scientific levels and then realize that their high school grades did not reflect their actual level, which is below the minimum requirements for enrolling in the university programs they chose. These feelings escalate after they fail the university admission exams.

Finally, the biggest obstacle to this wide education gap is faced by HEIs, which forces them to adopt additional basic courses into university curricula to raise their scientific level rapidly. The qualification imbalance in high schools' outputs has often prompted students to spend a full year before enrolling in university education to strengthen their scientific level to a level that allows them to enroll in higher education programs and pass the admission exams. In addition, HEIs often hold temporary, informal enrichment courses in primary scientific courses for high school graduates. In this context, the University of Aden, for example, employs an introductory year system for all enrolled students, teaching them several basic high school courses related to their orientations. After that, they enroll in their educational disciplines. However, all these measures cause students to lose an entire academic year, and thus, such decisions require continuous evaluation and in-depth studies.

5.2 Dropout rate between School and University education.

States and governments, in general, apply precise monitoring to their young citizens between educational stages, direct them towards the disciplines and fields required by the future, and establish new universities to accommodate them. Furthermore, they accurately recognize and control the size of students' dropouts at all educational stages [2]. Wars and crises cause countries to lose control over their students and education system altogether, as in the case of Yemen [19, 20]. The ongoing war and economic collapse in Yemen over the past decade resulted in an increased dropout rate from university education, approaching record levels in the recent past. This study relies on data collected from education ministries in Sana'a and Aden over several years. It compares the total number of high school graduates with the number of HEIs and vocational institutes. Based on the above analysis, the dropout rate in the Sana'a government areas reaches 48%, and in the Aden government (the legitimate) areas at 43.13%, with an average of 46% for the whole of Yemen. These alarming statistics represent a real warning to government agencies and all official and non-official organizations, both local and international, as a critical and dangerous indicator of the future of Yemeni generations.

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These findings reveal that about 46% of high school graduates in Yemen in recent years do not enroll in university or vocational higher education. As a result, approximately half of primary and secondary graduates leak into local and regional labor markets without proper qualifications. Suspicious camps belonging to local, regional, and international bodies attract thousands of these students, which may pose a strategic danger to the country's national security [19, 20].

5.3 Students' Performance at University Education

The academic performance of university students in Yemen during crisis and instability is determined by following the same sample of students throughout their university studies. The data shown in Figure 3(a) & (b) tracked hundreds of students and determined their levels from high school through university admission test grades and then university overall grades. For obtaining accurate results, the study sample was chosen from both public and private universities. As shown in Figure 3(a), the results showed a correlation between students' overall university grades and their scores on the admission exam. This correlation indicates that the university admission exams conducted at the entry stage by many colleges and programs to choose eligible applicants are accurate. Therefore, this study recommends continuing to conduct such admission exams and expanding them to other disciplines.

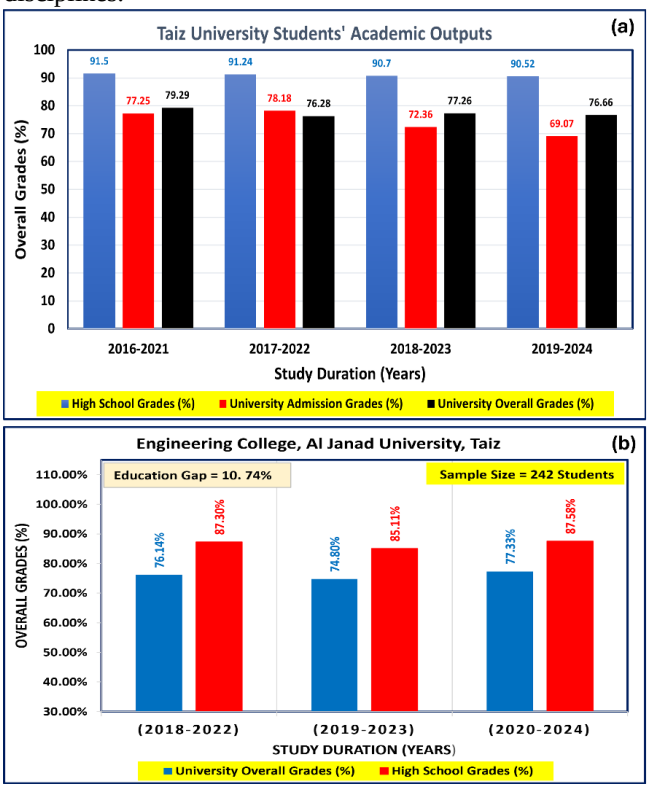


Figure 3. A comparison between secondary school final grades, university admission exam results, and university overall grades for (a) public universities and (b) private universities.

The results also showed that the average high school grades of students admitted to public universities are about 91%, compared to about 86.5% for those admitted to private universities. This difference appears reasonable, as private universities are officially allowed to admit fresh students with 5% lower scores than those required by public universities. Furthermore, the results demonstrated that the average grades of both public and private university students are close, at about 76-77% in engineering colleges. The results also showed that the average education gap between high school and university overall grades at public universities is 13.62%, a slightly larger percentage than that of private universities at 10.74%, as shown in Figure 3(b).

6. Conclusion and Recommendations

This study discussed the situation of secondary school graduates at the pre-university stage extensively and the challenges students face due to inefficient school education systems. The ongoing wars in Yemen have created complex challenges and difficulties for the primary, secondary, and university education sectors and have caused millions of children to drop out of school. Educational weakness and organized fraud in secondary education have created a large gap between students' final grades in high school and their real scientific level. This gap was measured in this research using a precise methodological approach to be, on average, 27.56% and again determined by a reliable data analysis of MHESR exam results at 26.36%. This educational gap narrows in urban and large cities, such as Sana'a, Taiz, and Ibb. However, it reaches levels between 40 and 50% in rural and remote governorates, such as Shabwa, Marib, Lahj, and Al Dhalea.

Many parties: students, parents, and educational institutions—suffer from this divergent educational gap. Working to reduce this gap costs the Yemeni family large sums and consumes precious time of students' lives. Students often wait a full year for informal rehabilitation before enrolling in universities.

Finally, the results of this study, based on official statistics, indicated that about 46% of high school graduates drop out after completing secondary education and before enrolling in HEIs. This large segment of Yemen's youth did not enroll in HEIS or vocational education. They join the labor market, recruitment camps, and legal and illegal immigration to neighboring countries without qualifications, so they constitute a great burden on the homeland. The alarming statistics presented in this study represent a real warning to government agencies and all official and non-official organizations, both local and international, as a critical and dangerous indicator of the future of Yemeni generations.

Finally, this study draws many recommendations to many parties, including HEIs and governments, and to all education instructors in Yemen. These recommendations are:

1. Encouraging access to university education by reducing barriers and addressing the challenges students face before enrolling in the university.
2. Taking urgent and well-planned actions to improve the quality of public education in Yemen and mitigate the significant educational gap identified in this study.
3. Ensuring that the Yemeni government takes the responsibility of restoring government support to public schools and HEIs and providing the resources and technology that ensure an optimal qualification for students.

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4. Encouraging HEIs in Yemen to continue conducting admission examinations to ensure the selection of eligible students for their chosen fields.

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