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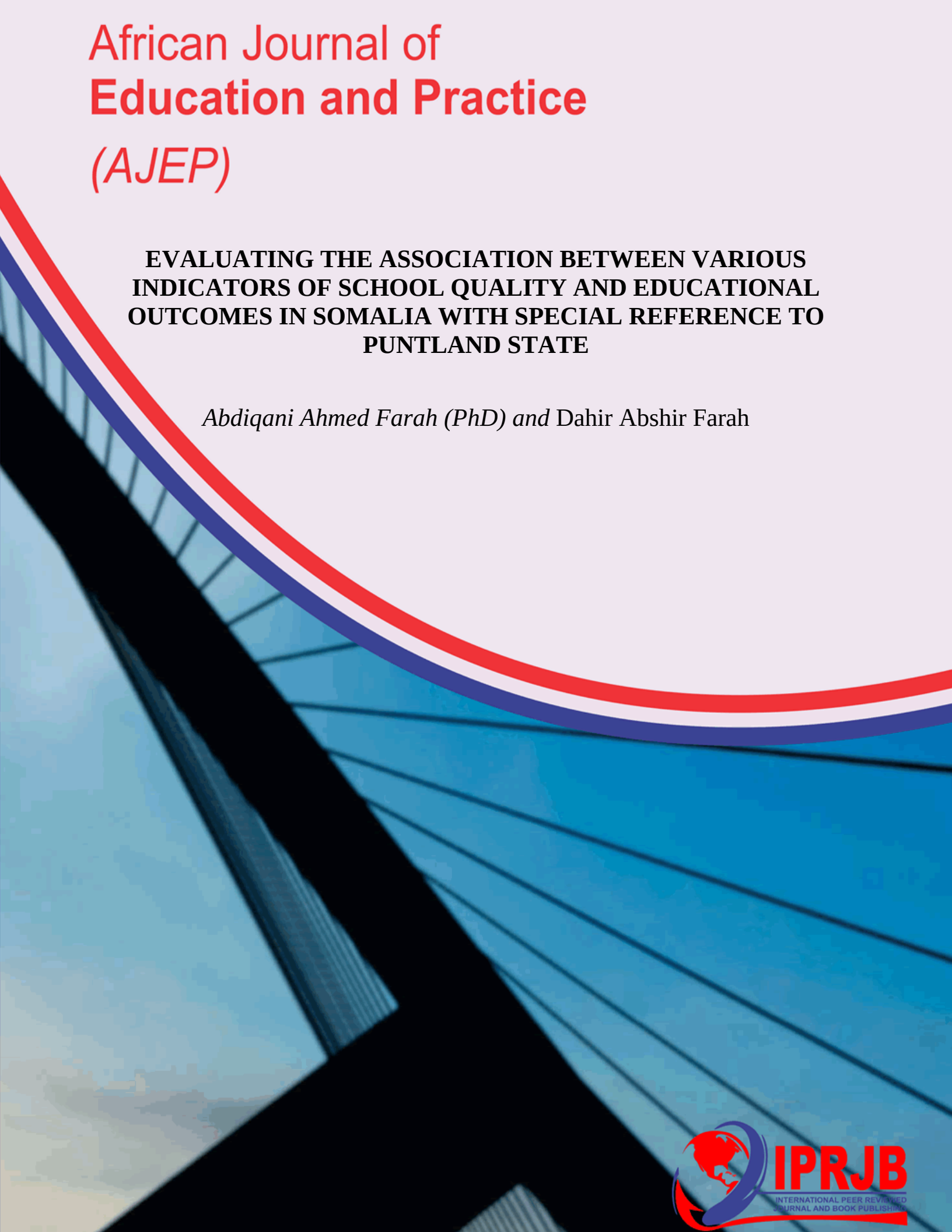

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EVALUATING THE ASSOCIATION BETWEEN VARIOUS INDICATORS OF SCHOOL QUALITY AND EDUCATIONAL OUTCOMES IN SOMALIA WITH SPECIAL REFERENCE TO PUNTLAND STATE

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Abstract

Purpose: the aim of this quantitative study is to highlight the major obstacles associated with the association between various indicators of school quality and educational outcomes that hinder adequate primary education from taking its foothold in Somalia at large and the federal state of Puntland in particular.

Methodology: This study used three retrospective data sources from the previous six school years, as well as raw data on the direct and indirect costs of primary education and their impact upon parents' affordability to send their children to school in the first place, which were collected from 27 primary schools using a cross-sectional approach. The study used descriptive and inferential statistics: compare mean ± SD, t-test and analysis of variance (ANOVA).

Results: In each considered scholastic year, on average, 30% of the population reached school-year and 167,439 enrolled, and of that, only a mere 5% qualified for the final year-eight exam. The outcome revealed a massive drop out along the way. Of the two types of primary education mise en scene, Alternative Basic Education (ABE) and Primary & Integrated Qur'anic Schools (PIQS), the parents enrolled their children in the latter on a 1:17 ratio. The enrollment rate of female and male pupils in the last six scholastic years has been 55% and 45%, respectively. The public-school regions examined were found to have been over three-fold higher than the private ones, though this doesn't have an effect on the cost of education per capita. As for the distribution of schools in the nine regions, there is a significant disparity among them, ranging from 32±1 to 128±11. The teacher-student ratio was found to be 36:1±3. The overall average number of teachers over six school-years was found to have been 4,420±458, out of which only 14% (609±104) stood as females, and that is below the 50% sub-Saharan Africa benchmark. Finally, the school cost per child/student in each month has been observed and found to have been $29±7. Consequently, the overall cost for every child per year becomes $234.224 against a background of low family income.

Unique contribution to theory, practice and policy: a set of recommendations have been proposed such as: conducting situation analyses on school excellence and educational reforms to be formulated periodically to meet SDG 4 targets; meeting the future needs of education financing; better regulating both public and private schools; closing the gap in teacher-student ratio; the lowest ratio of female teachers in primary education; and for the government to explore in the direction of future education financing in order to better regulate both public and private schools.

Key words: Primary education, enrollment, drop outs, student-teacher ratio, teacher school ratio, male-female teacher ratio, school cost per child

INTRODUCTION

The history of modern formal education in Somalia dates back to the UN Trusteeship administration between 1950 and 1960, and was tasked with preparing and educating Somali people to be able to govern their country once they gained independence, Article five (5) of the Trusteeship Agreement, provided for the establishment of modern education systems for Somali children and adult learners. Subsequently, in the 1961/62 school-year, 18,000 students enrolled in various schools throughout Somalia (Abdi, 1998). However, the civilian and military governments accelerated and gave due precedence to the education system, but everything changed when the central government collapsed in early 1991. Among the United Nation's millennium development goals (MDG's) was the completion of universal primary education (UPE) by 2015 as mass education and the supply of an educated labour force, socio-economic growth, and the reduction of regional disparity are intertwined (UNESCO, 2020; Chimombo, 2005). According to Harvey & Green (1993) quality is defined 'as expressional, as perfection, as fitness for purpose, as value for money as transformative'. Therefore, levels of student achievement in early education and institutes' excellence and efficiency as well as the relationship between school quality and socio-economic disadvantage in raising literacy are hitherto pressing issues in the developing countries (Reddy and Kanjee, 2011). There are significant indications that inadequate school quality accounts for low levels of literacy and achievement among developing countries children (Fuller, 1986, Heyneman, and Loxley, 1983). In addition, the effects of a child's pre-school and socioeconomic background are important factors that could make a considerable transformation in a child's achievement (Fuller, 1986). By the same token, the expansion of school attainment has not guaranteed improved economic conditions (Hanushek and Lavy, 1994; Harbison and Hanshek, 1992; Hanushek, 2006). Rather, the intellectual proficiencies of the population are impressively akin to personal incomes, to the leveling up of incomes, and to economic development (Hanushek and Woessmann, 2007).

Primary education in industrialized countries is gradually shifting away from a traditional European model based on social studies, math, and numeracy studies, school substructure and pedagogical resources, teacher features (education level, guidance, familiarity, sex, and ethnicity), and school setup (student-teacher ratio, teaching practices, devolved administration, and educator agreements and working environments) on student enrollment and learning into human growth. Thus, under the new curriculum, daily life skills are emphasized in the lessons for training, which in turn will have potentially transformative effects if equally cascaded into the entire developing countries, from impoverished to wealthy (Majumdar, A, 2020; Devkota and Bagale, 2015).

Most developing countries have not achieved the required level of school excellence in terms of infrastructure, facilities, materials, curriculum-cum-syllabus, teacher-student ratio, and knowledge gaps of school staff to methodically evaluate children and parents' school results. It is differentially due to a lack of intention on the part of respective developing country governments, as well as social, religious, and economic issues in those countries (Otike and Kiruki, 2011; Majumdar, A, 2020; Bowen & Powers, 2005; Devkota and Bagale, 2015; Setiawan, 2018)). As a result, while the UN's attempt to establish a global model of education through free universal education has been successful, it has not given equal weight to various factors such as quality education, classroom attendance, professional development, and financial reward, and it has not received equal success from all developing countries. Thus, success has

been divided based on a country's economic structure, such as lower-income countries, middle-income countries, and high-income countries. It is difficult to achieve success in primary education without economic stability or a strong educational budget.

As far as the Somali setting is concerned, after thirty years of civil war, a situation exacerbated by the global pandemic exists in a fashion deemed more severe than their sub-Saharan counterparts to the least. To be more specific, the term "school quality" is frequently used to assess, among other things, government investment strategies, student performance and achievement,Textbooks, class number, laboratories and teacher quality, which is linked to their salary level, have been revealed to reliably impact upon student attainment (Fuller, 1986). Whereas, Glewwe and Kremer (2006) expressed restraint to make a sweeping statement improving school quality may not be through snowballing inputs that hinges on teachers or text books, but preferably through technologies that circumvent the setback of weak schooling such as computers and radio instruction. In a concise way, Hewett *et al* (2008) categorized school quality into four components: (1) educational facilities such as desks, teaching manuals, text books, as well as the certification, knowledge and obligation of educators, (2) time devoted to instruction such as length of school day, teacher absenteeism, and student teacher ratio; (3) teaching space subtleties and didactic methods including teacher treatment and sustenance of students, chastisement and errands (4) Disparities in teacher stances and behavior/perception, such as harassment, intimidation, and violence against boys and girls in schools.

The fulcrum of United Nations' Sustainable Development Goal 4 is to realize equity in education provision to the degree that no one is left behind. The desire to achieve equity in education delivery to the extent that no one is forsaken by redirecting the thrust of educational financing towards poor and civil war-overloaded countries such as Somalia so that they will have adequate financial resources to meet SDG 4 (Chikoko and Mthembu, 2021). As Walker *et al* (2019) argue, basic/primary education is an extremely important means by which the poor confront increasing inequalities and generate decent earnings for themselves. Predominantly, in countries like Somalia that are emerging from protracted civil war, education is considered critical for individual poverty alleviation, the attainment of gender equity, women's emancipation, and societal economic growth. In addition, the school is the main learning and socializing institution outside the family. Unlike the pre-civil war status of schooling whereby the state guaranteed free education and subsequent job guarantee policy (Farah, 2020), presently large sway of children in Somalia going to school and getting a quality education is still an aspiration. And, its mainly to do with parents who are unable to financially support their children's education, poverty, accessibility to school, security matters and social norms that inhibit for the girls to go to school, children in nomadic/pastoralist life are in constant move and frequently deprived of their rights to an education etc. (Unicef, 2021). Very little research has been conducted on the influence of the above factors that effect on school efficiency, achievement levels of students in Puntland state of Somalia or any other part of the country for that matter. Consequently, the work here ventures into the state of primary education to identify factors that hinder the endeavor of increasing school efficiency for the good of student attainment based on the past six years school characteristics that consistently influence performance, and deduce how best to improve the quality of schools is discussed within nine regions of Puntland federal member state of Somalia.

THEORETICAL FRAMEWORK OF PRIMARY EDUCATION OF PUNTLAND STATE OF SOMALIA

The goal of the work given here is to promote informed discussion among educators, policymakers, and others interested in educational reform in Somalia in general and Puntland State in particular, as guided by learning and teaching theories. In this way, a theory assists policymakers and educators in making informed decisions regarding learning design, development, and delivery by identifying the connections between education reform and practice, as well as the underlying social, economic, and political theories (Wilson and Peterson, 2006; Bransford et al., 2006).

On that note, Primary education is the first level of formal education in Somalia, followed by secondary and tertiary education (Abdi, 1998). With the exception of fast-tracked Alternative Basic Education (ABE) in which students complete primary education in five years, primary education consists of lower and upper primary, where it takes four years each to complete (MoE&HE, 2020). Primary school education is proffered to students in the age brackets of 6 to 14. ABE describes flexible programme of study which is built essentially to answer the issue of accessibility and participation for children unable an admittance to formal education in the arrangement its presently offered (Salad, 2018), while Primary & Integrated Quranic Schools (PIQS) is the eight years conventional primary education with extra qur'anic lessons (MOE&HE 2016/20).

Research aims

The aim of this quantitative study is to highlight the major educational snags significantly hindering the take-off of better primary education in Somalia in general and the federal member state of Puntland in particular. The research is a longitudinal study being implemented in primary schools in nine districts of Puntland aimed at eight school-years to explain the levels and delivery of primary education for all school-reached children as well as to evaluate the association between various indicators of school quality and educational outcomes. Indicators such as enrollment, dropouts, gender parity, candidates for final exam, rate of promotion to secondary school, student-teacher ratio, class-teacher ratio, school-teacher ratio and school-region ratio, male and female teacher ratio, and finally the educational cost and its effect on parents' affordability to send their children to school in the first place. We then describe the research setting, the study design and the samples, with the results and recommendation/conclusions following.

An improved education system will directly affect a country's ability to achieve its full economic potential (Otike and Kiruki 2011, Setiawan, 2018). The education system in Somalia is largely privatized, and the purpose of this study is to promote the concept of free basic education and achieved the required level of school excellence in terms of infrastructure, facilities, materials, curriculum-cum-syllabus, teacher-student ratio, and gaps exists on the part different stockholder such as government and school management to evaluate children's school needs assessment and results in post-conflict Somalia in accordance with the United Nations' Millennium Development

Goals (MDGs) (UNESCO, 2020). That created knowledge gap for students to progress through primary education into secondary school (Unicef (2021).

METHODOLOGY

There are three retrospective data sources used in this study. We abridged each of these in table format in the main body of the paper and in Appendices Ia & Ib. The Ministry of Planning, Economic Development and International Cooperation (MoPEDIC) and Ministry of Education and Higher Education (MoE&HE) statistics year books of Puntland 2014/20 annual reports data has been employed in the study. Correspondingly, during the study, secondary data from the last six school-years was also utilized to gauge the standard of primary education in Puntland since the 2014/15 scholastic year. Descriptive as well as inferential statistics, compare mean ± SD, t-test and analysis of variance (ANOVA) were applied in the study. In addition, to assess the existing context of primary education in Puntland, raw data was collected from 27 primary schools by means of a cross-sectional approach. In all of the nine provinces in Puntland, three primary schools were visited in each region. During the data collection, it was focused on the direct and indirect costs of primary education. The findings are presented in a logical sequence of tables (in the body and appendices), numbers, figures, and statistical inferences that address the goals and objectives, discussion, and recommendations, as well as for potential users of the findings.

RESULTS

According to the demographic status of Puntland built on the school reach, enrolled and final exam candidates for the investigated school-years (2014/15 to 2019/20), Ministry of planning, economic development and international cooperation education statistics year books (MoPEDIC, 2014/20), based on the population estimation survey (2014) pg 15, and the estimated population growth rate of 2.75, 2.78, 2.82, 2.84, 2.87 and 2.9% (Worldometeres of 2014/20), the total population growth per year has been calculated. Out of that, the number of children who reached school age has been subsequently inferred to be 30% of the total population between the 2014 and 2020 school years. Also, affirmed upon the MoE&HE statistical year book (2014/20s), the number of pupils enrolled for the respective school-year and the figures for the number of pupils who completed primary education and qualified for the final grade eight examination were also tabulated in the study (Table 1).

School/Year	Population/ Estimated	Population growth rate/year.	Projected population growth per year	Total population per year	30% School reached (From statistics year book)	Enrolled (From statistics year book)	Final exam candidates (from Stat year book)
2014/15 (base year)	4,334633	2.75		4,334633 (base-year)	1310291	145,639	7,255
2015/16	4,334633	2.78	120503	4455136	1346717	157,003	7,821
2016/17	4455136	2.82	125635	4580771	1384694	153,108	8,800
2017/18	4580771	2.84	130094	4710865	1424019	161,121	9,164
2018/19	4710865	2.87	135202	4846067	1464888	182,554	10,011
2019/20	4846067	2.90	140536	4986603	1507370	205,210	11058
Average	4,543,684		130394	4,652,346	1406330	167,439	9,018
SD	207849		7851	243982	73751	22292	1397

Table 1: Demographic Status of Puntland based on the school's reach, enrolled and final exam candidates for a respective school-year source[1].

Emanated from the estimated population census by MPED&IC (2014) driven by the number of schools reaching children (691226 of girls and 619065 boys), total number ready to register in the 2014/15 school-year was 1310291 (Table 1). The number of enrolled and the final examination candidates has been collected from the respective educational statistics year books by Puntland Ministry of Education and Higher education (MoE&HE 2014/15 to 2019/20). When observed the rate of enrollment, there was a great deal of disparity between the average registered number of children for a specific school-year and the number of school-reached children in the six school-years examined, with a significant level of $1.8x10^{-8}$ @ 95% confidence intervals (CI). Of the two types of primary education environment in Puntland state of Somali, ABE and P&IQS, the number of school-reached students enrolled for the respective programs was also analyzed, and found highly significant number (P-value: 1.8x10-5 @ 95% Cl) of the parents, almost 1:17 ratio, showed tendency towards, thus enrolled their children, the later (Table: 2). When tested the number students enrolled for particular school-year in six school-years examined in the study, and those endeavored to reach year eight hence qualified for the generalized primary education examination, the result revealed prodigious disparity with a significance of 1.2x10-5 @ 95% CI (table: 2). Almost all enrolled with the average of 167439±22292 fall through along the way, and according to data supplied by ministry of education (MoE&HE) statistics year books, 2014/20) only 5% with the average of 9018±1397

[1] Ministry of Planning, economic development and international cooperation (2014). Population Estimation Survey. *pp, 15.* Ministry of Education (2014/15). Education statistics year book. pp 32, 59, 92. Ministry of Education (2015/16). Education statistics year book 2015/16. Pp 32, 59, 92. Ministry of Education of Puntland (2016). Education statistics year book. pp 24, 55, 87. Ministry of Education of Puntland (2017/18). Education statistics year book. Pp 30, 57, 82. Education statistics year book. Ministry of Education of Puntland (2018). Education statistics year book. pp 27, 53, Ministry of Education of Puntland (2019/20). Education statistics year book. pp 24, 72, 102. (Table 1).

became eligible for the generalized primary education examination aimed at the intermediate school certificate.

School-Year	School reached	# Enrolled	P-value School reached Vs Enrolled	Primary & IQS enrolled	ABE enrolled	P. Value Primary & IQA Vs ABE enrollment	Final exam candidates	P. Value Enrolled Vs Final Exam Candidates
2014/15 (base school-year)	1310291	145,639	$1.8X10^{-8}$	137525	8,114	$1.8X10^{-5}$	7,255	$1.2X10^{-5}$
2015/16	1346717	157,003		147827	9,176		7,821	
2016/17	1384694	153,108		143,546	9,562		8,800	
2017/18	1424019	161,121		156,487	4,634		9,164	
2018/19	1464888	182,554		177,838	4,716		10,011	
2019/20	1507370	205,210		199269	5941		11058	
Average	**1406330**	**167439**		**160415**	**7024**		**9018**	
SD	**73751**	**22292**		**23646**	**2212**		**1397**	

Table 2: School reached, enrolled and finalized exam candidates for the 6 school-years examined. source[2].

The enrollment rate of female and male pupils at primary school reached children in the last six scholastic years, specifically stipulated are the number of students enrolled in every school-year and Percentage distribution of boy and girl students. Out of the total number registered in the respective school-years, 55% (91,609± 11350) were male students, while 45% (75,831± 11008) were female. Statistically, the average enrollment rate of girls is slightly but significantly lower than that of boys, with a P-value of 3.5x10-2 @ 95% CI (Table 2).

School- Year	Total enrolled	**Male students enrolled**	%	**Female students enrolled**	%	P-Value M&F Enrolment
2014/15	145,639	81,438	56%	64,201	44%	$3.5x10^{-2}$
2015/16	157,003	86441	55%	70,562	45%	
2016/17	153,108	83,777	54.7%	69,331	45.3%	
2017/18	161,121	87,179	54.1%	73,942	45.9%	
2018/19	182,554	100,301	55%	82,253	45%	
2019/20	205,210	110,516	53.8%	94694	46.2%	
Average	167,439	91,609	55%	75,831	45%	
SD	22292	11350		11008		

[2] Two ways t-test, assuming unequal variances, has been carried out for the disparity between the total Primary & IQS enrolled and ABE enrolled in Puntland for the years between 2014/15 and 2019/20 school-year with a p-value of $1.8X10^{-5}$ @ 95 CI. Similarly, when tested the number enrolled for specific academic year against the students reached final examination of the primary education, it has been found there is also a highly significant difference between them with a P-value of $1.2X10^{-5}$@ 95 CI. Also, the school reached Vs enrolled was tested with P-value of$1.8X10^{-8}$ @ 95 CI.

Table 3: Male and female enrollment trends of primary education students for the last 6 years**.** it has been found that the average number of girls (75,831, 45%) enrolled is significantly lower that of the boys (91,609, 55%) with p-value $3.5x10^{-2}$@ 95% CI. Source[3].

As aforesaid, the overall average number of students who completed intermediate or grade 8 school-year and were ready to sit for the final generalised examination became 9018 ±1397, out of which 43% were girls, and that is not significantly different from the boys, with a P-Value of $5.5x10^{-2}$ @ 95% CI. The education statistics yearbooks (2019/2020) data examined also specify the pass rate, eligibility for secondary education, and the percentage distribution of boys and girls as well. When tested the average total number of boys promoted against that of girls for the respective school-year intended for the six years assessed, there has been no significant difference between them with a P-value of $6x10^{-2}$ @ 95% CI (Table 4). Another important aspect to observe is the magnitude of the dropouts who failed, at any rate, to get their seats in the first year of secondary school. On average, only 493± 310 out of 8,525±1440 children failed to register themselves into year one secondary school classes for that particular school-year. This means those registered for form one secondary school are more highly significant than those who never register for themselves, with a P-value of $7.98x10^{-5}$ @ 95% CI (Table 4). Another important aspect examined was the male and female dropout rate, which was unsuccessful in featuring in form one secondary school classes. And, as a result, 262±133 of boys failed to turn up to the classes, while 231±182 girls didn't feature either. That means the boys' dropout is not significantly different from the girls, with a P-value of $7.5X10^{-1}$ @ 95% CI (Table 5).

[3] Ministry of Education (2014). Education statistics year book. pp 32, 59. Ministry of Education (2015). Education statistics year book 2015/16. Pp 32, 59. Ministry of Education of Puntland (2016). Education statistics year book. pp 24, 55. Ministry of Education of Puntland (2017). Pp 30, 57. Education statistics year book. Ministry of Education of Puntland (2018). Education statistics year book. pp 27, 53. Ministry of Education of Puntland (2019). Education statistics year book. pp 24, 72.

School- Year	Total candidates for final exam			M&F P-Value	Percentage (%)		Total promoted to secondary schools			p-value on male and female promoted	P-value Candidates Vs Promoted	Total Drop out	P-value Candidates Vs Dropout
		M	F	$5.5x10^{-2}$	m	f	Total	M	f	$6.14x10^{-2}$	$5.6x10^{-01}$		$2.7X10^{-5}$
2014/15	7,255	4,522	2,733		62.3%	37.7%	7,079	4,417	2,662			176	
2015/16	7,821	4,785	3,036		61.1%	38.9%	7,262	4,443	2,819			559	
2016/17	8,800	3,586	5,214		40.7%	59.3%	7,739	3111	4,628			1061	
2017/18	9,164	5,443	3,721		59.3%	40.7%	8790	5,241	3,549			374	
2018/19	10,011	5,966	4,045		59.6%	40.4%	9,516	5,691	3,825			495	
2019/20	11058	6,485	4,573		58.6%	41.4%	10,765	6,314	4451			293	
Mean	9,018	5,131	3,887		57%	43%	8,525	4,870	3,656			493	
SD	1397	1049.3	931.7		8%	8%	1440.4	1129.5	813.1			310.4	

Table 4: Grade 8 final centralised examination candidates and number of promoted to form one secondary school. Source[4].

School- Year	Male dropouts	%	Female dropout	%	P. value
2014/15	105	6.7	71	5.1	$7.5X10^{-1}$
2015/16	342	21.8	217	15.6	
2016/17	475	30.3	586	42.2	
2017/18	202	12.9	172	12.4	
2018/19	275	17.5	220	15.9	
2019/20	171	10.9	122	8.8	

Table 5: Grade 8 final centralised examination male and female dropouts. The boy's dropout are not significant different from girls with P-value of $7.5X10^{-1}$ @ 95% CI (Table 5). Source[5].

As far as teachers' trends are concerned, the overall average number of teachers over six school-years was found to have been 4,420±458. Out of that, 3812±394 were male, whereas a mere

[4] Ministry of Education (2014). Education statistics year book. pp 92. Ministry of Education (2015). Education statistics year book. pp 92. Ministry of Education of Puntland (2016). Education statistics year book. pp 87. Ministry of Education of Puntland (2017). Education statistics year book. Pp 82. Education statistics year book. Ministry of Education of Puntland (2018). Education statistics year book. pp 79. Ministry of Education of Puntland (2019). Education statistics year book. Pp 102.

[5]

609±104 (14%) became female teachers. And, statistically, the proportion of female teachers is highly significantly lower than their male counterparts, with a P-value of $1.3X10^{-6}$ @ 95% CI (Figure 1; Table 6 in the appendix Ia).

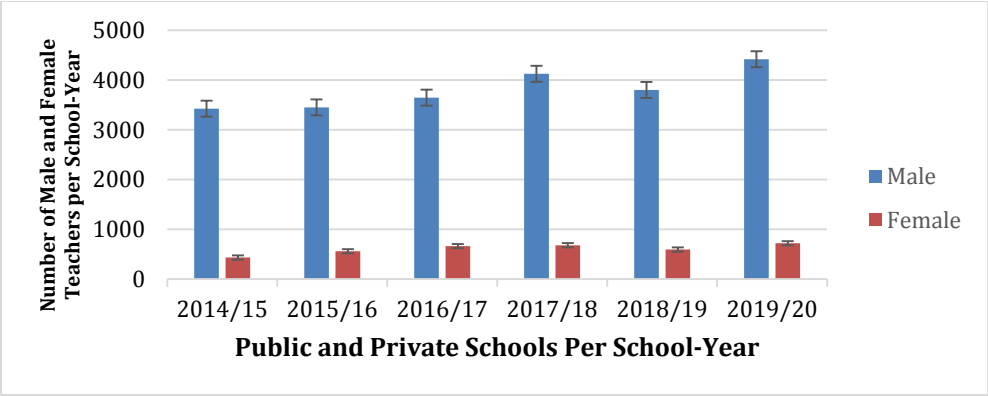

Figure1: Number of male and female teachers per school-year. Out of the overall average teachers,

3812±394 were male, whereas mere 609±104 (13%) became female teachers with a P-value of $1.3X10^{-6}$ @ 95% CI (Table1 in the appendix Ia)

When the supply of teachers per region in the nine regions with reference to school-years was examined in a blocked design two-way ANOVA without replications, there had been great deal of disparity in the distribution of teachers in a given region with a P-value of $9.5x10^{-25}$ @ 95% CI. After tested the teacher distribution in the six school-years considered in the study with one way ANOVA, there was no significant difference among the teachers with a P-value of $9.6x10^{-1}$ @ 95% CI (Figure 2 and 3 respectively).

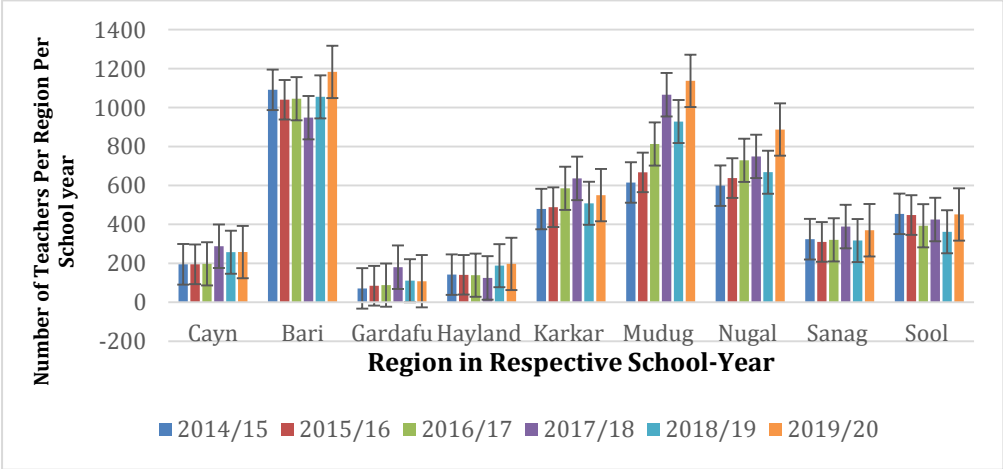

Figure 2: The supply of teachers in the nine regions in terms of school years was examined using a blocked design two-way ANOVA without replications, and a disparity in the distribution of teachers in given regions was inferred with a P-value of $9.5x10^{-25}$ @ 95% CI.

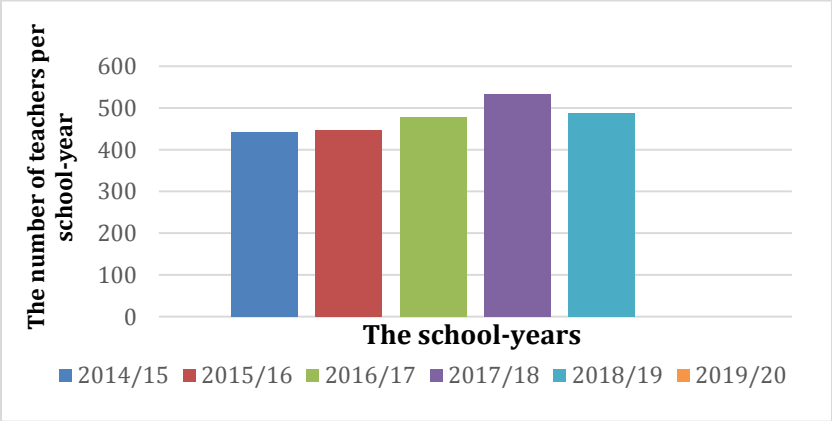

Figure 3: When tested the teacher distribution in the six school-years considered with one way ANOVA, there are no significant difference among the teachers according to school-years with P-value of $9.6x10^{-1}$ @ 95% CI

When looking at the student-teacher ratio in primary education, based on education statistics yearbooks 2014/15-2019/20 respective school-years, states that teacher-student proportion for the 6 school-years investigated as 33:1, 33:1,35:1, 33:1, 33:1, 39:1, 38:1 respectively. But, after calculated from the available data regarding the ratio of the number of students enrolled per year/annually and total teachers per year (tables 1,2, 3 and 6 of appendix Ia) in the respective years, it has been obtained that the student teacher ratio as 37±4:1, 37±2:1, 36±3:1, 32±1:1, 42±3:1 and 32±4:1. Hence, there is a discrepancy of ± 4, ± 2, ± 3, ± 1, ± 3, ± 4. Attained from the MoPEDIC Puntland Facts and figures, department of statistics (2020), Pp 20, the student-classroom ratio as 41:1, 44:1, 37:1, 46:1, 45:1 two years missing (table 6 in the Appendix Ib).

As for the average distribution of schools in the nine regions with reference to seven school-years is concerned (32±1, 128±11, 27±4, 23±3, 96±11, 122±37, 106±14, 54±4, 66±4), ANOVA two-factor without replication was performed to test if there are significant differences among the regions in a given year. Blocking is employed to further reduce the level of unexplained variations with the second factor (regions). The influence of additional factors (off the tarmac road, the salary variations of the teachers, the number of students and schools) could be controlled by blocking them away. The F calculated is greater than the F critical with a P-value of $5.4x10^{-19}$ @ 95% CI. That means at least two of the nine regions of the six school-years are significantly different from each other. In order to identify which region is significantly different from the other, post hoc test was performed to ascertain the level of significance between each pair of the tested six academic/school-years, and the result was that all regions showed a statistical significance difference between them except the Bari and Mudug regions (Figure 4).

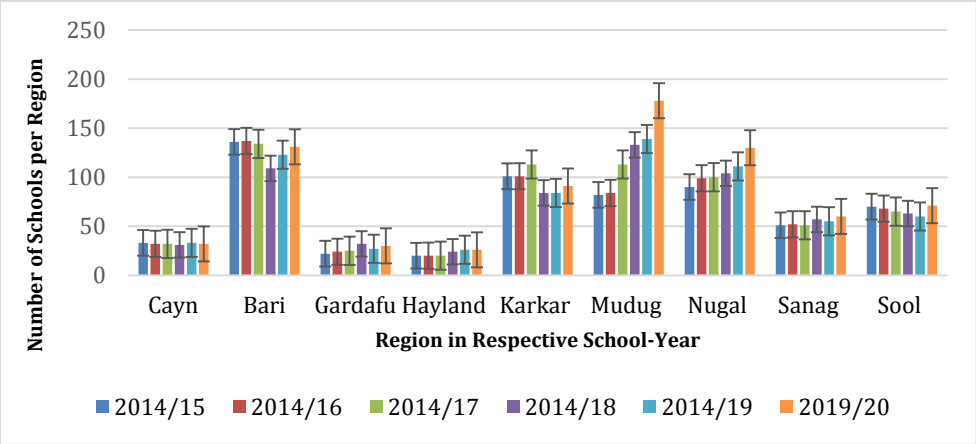

Figure 4: Number of schools per region in a respective school-year. ANOVA two-factor without replication was performed to test if there were significant differences among the regions in a given year. With a P-value of $5.4x10^{-19}$ @ 95% CI, the calculated F is greater than the critical F.

The number of public and private schools in the land has been first analysed as far as the number of school-years and their distribution in the nine regions is concerned, and secondly, if there are distinctions between the two to the extent of learning expenses per child. On that account, the disparity between the two types of schools in so far as the number of school-years has been tested, and found that on average, the public ones are three-fold higher in number (485±114 and 168±80 respectively) than the private ones, with p-value $3.5x10^{-4}$ with @95 CI (Figure 5).

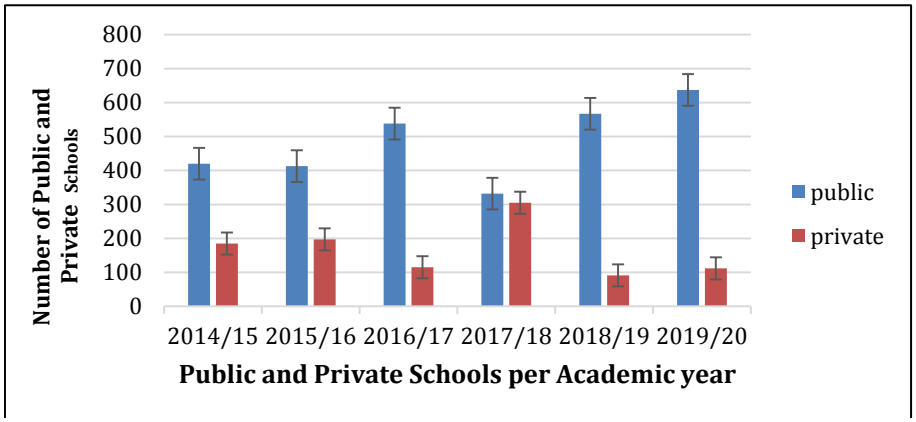

Figure 5:

The total number of public and private schools in the nine regions of Puntland State of Somalia ± SE (Table 6 of the appendix Ia). The significance was for the difference between public and private schools, with a p-value of $3.5x10^{-4}$ @ 95 CI**.**

To get the bigger picture, the overall averages of public and private schools throughout the nine regions was tested with a mean of 54 ± 32 and 19±21 respectively (Table 6 in the Appendix 1a).

Two Sample t-Test Assuming Unequal Variances was performed and found out that there is significant gap (P-value $8.14x10^{-10}$ @ 95% CI) between the number of schools types (Figure 6).

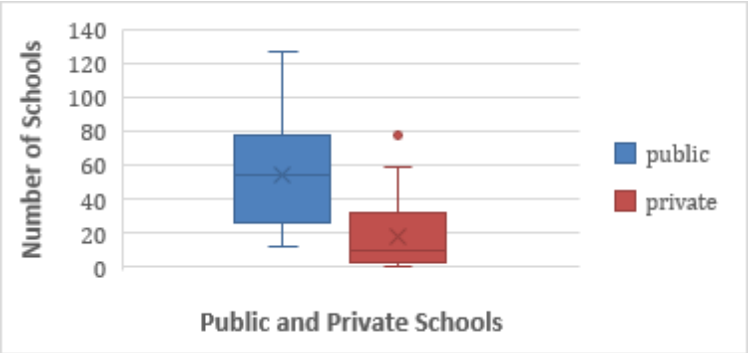

Figure 6: Two-Sample assuming unequal variances t-Test was carried out to ascertain extent of the gap between the public and private schools with p-value of $8.14x10^{-10}$ @ 95% CI.

Finally, the school affordability and cost per child themes have been observed emanated from the data available in table 6 of the appendix Ib. Thus, data regarding school fees, cost of transportation, fees for midterm & final examinations, cost of text & exercise books per item per student each month (all in dollars as it's hitherto the sole tender note for transactions in Puntland) were collected from three schools in each of the 9 regions of Puntland (Figure 5 and table 6 of appendix Ib). The averaged breakdown of the above fees for three schools in each region has been sampled and found to have fees per student for every month, cost of transportation, fees for midterm and final exams, and cost of text & exercise books as 14, 3, 4, 0.6 and 4 dollars respectively (figure 5). When averaged them, they came up at $29±7 per child per month. Consequently, the overall cost per child per one school-years becomes $234.224. Predicating that amount of the available average household expenditure per year of $3,461.96 ($288.5/month), it comes to a considerable sway of the family expenditure per month (12%) goes to only one child's school expenses. Therefore, against the background of the average number of children in a household in Puntland of six, and, according to the Demographic Information and Household Characteristics of the Somali Health and Demographic Survey by Puntland Statistics Department, Puntland State of Somalia (PLHDS, 2014/20), to nuclear family adherent's 32 percent of households have foster and/or orphaned children makes difficult to send all the children to school. ANOVA Two-Factor Without Replication has been carried out to test if there is a significant difference between the regions insofar as the fees is concerned, and the result was that there is no significant difference among the fees levied upon students by the school authorities of the respective regions, with P-value of $2.31x10^{-1}$@ 95 CI.

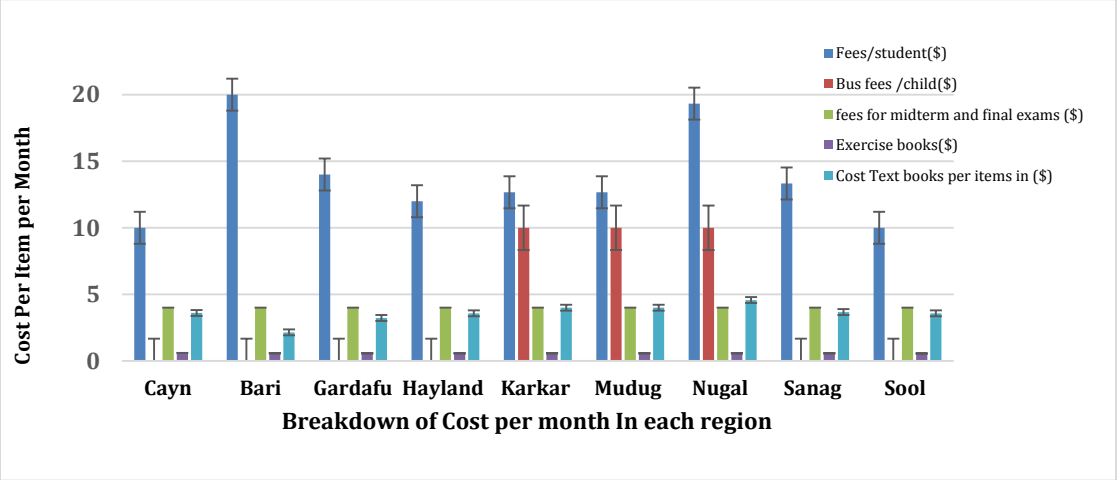

Figure 7: school fees per student on each month, cost of transportations, fees for midterm and final exams and cost of text and exercise books per items (all in dollars as it's the sole tender note for transaction in Puntland). The average school cost per child per region has been calculated as $29± 7. ANOVA two-Factor Without Replication was used to test on the variations among fees per region and found that there is no significant difference among the fees levied upon students by the school authorities of respective regions, with P-value of $2.31x10^{-1}$@ 95 CI.

DISCUSSION

Access to basic education continues to be a matter of serious concern in Somalia in general and Puntland in particular. The universalisation as well as quantitative expansion of the system in terms of the attainment of the ambition on affordability (direct and indirect cost) for parents to send household children based on ostensible build up in enrolment-ratios, decreased dropouts, student-teacher ratios, class-student ratios, literacy rate and other infrastructural facilities appears to be very slow over the best part of the last thirty years: since the demise of the central government. From the outset, although the Puntland administration regulates schools, government owned or otherwise, throughout the nine regions studied, it doesn't provide free education to the children, thus rendering at least the direct cost of education unaffordable. As a result, affirmed by the MoE&HE statistical year books (2014/20s), the 30% school reached children and the enrolment rate disproportion is astronomically huge. Thus, poor enrolment rate and the access of education, particularly vulnerable section of the society, primes to put a question mark on government role and the ways it measures affordability index and financial constraints against background of the Puntland average family expenditure (though a differential range) of meager 288.5/month per family, it could be one of the main reasons for non-enrolment in schools, and for the parents find hard to keep their child in the school throughout the 8 years period of primary education (Shah, 1989; Diwan, 1992). Furthermore, though it will be explored more later in the discussion, the relationship between governmental educational inputs in covering some of the school expenditures and community oversight and involvement has considerable correlation with the retention or dropout rate (Case and Deaton, 1999; Glewwe and Kremer, 2006). The preference parents shown towards Primary & Integrated Qur'anic Schools (PIQS) over & Alternative Basic Education (ABE) in a 1:17 ratio can only be explained, though there could be other unexplained attributes, in addition to the normal primary education

curriculum, there is a koranic syllabus included in the curriculum. The lofty dropouts along the way, from enrolment to eligibility for the generalized primary education examination after eight years in primary education, could be described as might be due to poor education quality students lose yearning to learn, exacerbated by not given due attention by government and other stockholders. Also, increased dropouts elevate the number of street children and child laborer and reduces girls' education (Otike and Kiruki 2011). As a result, even those enrolled only 5% became eligible for the generalized primary education examination after eight years in primary education. That means 95% of the enrolled fall through along the way (MoE&HE statistics year books, 2014/20), and if that is, among other aforesaid attributes, associated with the student's level of scholastic performance is predicated upon the intensity of material investments assigned to schools on a per-student basis. To sum it up, as far as the huge dropouts experienced in the federal member state of Puntland primary education is concerned, the matter puts the association between social, political, economic and in the dropout rate from primary schools in major colours (Levy, 1971). To the extent that the boys' and girls' enrolment rate is concerned there has been 5% lopsidedness towards boys, and does not seem to play a significant role in here. Similarly, the gender disparity among those who have finished grade eight and are ready to sit for the final generalized examination is not significantly different from each other. Consequently, its an indication of the parents' bias towards boys is being faced out gradually, and the awareness of parents in educating young women contributes to the girls' better future quality of life, social mobility as well as women's emancipation in the 21st century world, as the disparity between gender opportunities in Somali society influences quality of life (Bourne, 2010).

In terms of gender disparities among teachers, only 13% of primary school teachers are female on average. Comparatively, Sub-Saharan Africa remains at just below 50%, while in the EU Member States, since 2019, out of 2.0 million teachers, women's representation has been at 85%. The finding has two connotations here: First, it proves that since independence hardly little has changed in the existing gender imbalance and the deficiency of female teachers in the teaching profession. Secondly, the culture of presenting girls to do household chores at their early ages persisted and proved an obstacle for them to pursuing teaching as a career (Cassanelli & Abdikadir 2008). This goes against the predominant belief that female teachers are more nurturing than men and are ideal candidates to fill the role in primary education (Wood, 2012). Michaelowa (2002) discovered that among the variables demonstrating teachers' sex (gender) do appear to be relevant in her work regarding primary education in francophone Sub-Saharan Africa, and usually, men give the impression of being less satisfied with their teaching occupation than women are in the sector.Another research examined the impact of female teachers on child education at the primary school level in Yola North and South Local Government Areas (LGAs), Adamawa State, Nigeria to observe the added value of having female teachers in primary schools and their effect on the enrollment, retention, and school performance of girls in primary schools. And, the study disclosed the positive impact female teachers in primary schools have on the girls' scholastic performance in the aforesaid areas. Furthermore, their vital roles as mentors in delivering a sound holistic education, such as for girls' social knowledge, can help them integrate and become better members of their societies as well as play dynamic parts in their families (Mike and Muhammad, 2020). On the whole, though Sub-Saharan Africa remains the region with the lowest percentage of female teachers in primary education, at just below 50% within countries, 13% of Puntland state of Somalia's female

teachers are particularly improper and require immediate attention to be remedied as, among other factors, it has significant implications for girls' enrolment and their ability to endure in school. For this reason, the findings in here could have some other connotations such as the community and the administration does not encourage women graduates to apply for the teaching job, might be due to cultural factors that inhibit qualified women from expressing a tendency towards the job. In addition to the cultural factors contributing to the problem (Cassanelli & Abdikadir 2008), the dismal number of female teachers severely questions existing teacher training institutes and Ministry policy. To sum it up, having female teachers feature in primary education stimulates children's awareness, supports children in doing homework and creates affinity with teachers, to mention a few (Sulochana, 2015). Devkota and Bagale (2015) explaining the way forward on the challenges of primary education and dropouts in Nepal, recommended the activities that could help to attenuate the dropout rate in primary education and added 'encouraging female teachers into the fold'.

The distribution of the schools in the nine regions is built upon the population distribution throughout the regions, where towns along the tarmac road are better populated than those in the hinterland, thus fewer schools. The only noteworthy is that there is no distinction between public and private schools as far as school fees and other learning expenses are concerned (Figure 5, 6 and table 7 of the appendix Ib). The role government has in public schools, apart from ensuring such schools keep their status prior to the 1991 civil war as 'government owned', is that the ministry of education regional officer appoints the headmaster of the own schools in their tutelage (region). Notable is that there is a community education committee in every school, irrespective of their standing as public or private, and their role is to liaise with the community and parents, raise awareness and advocacy.

Components of the educational atmosphere that are potentially associated with the development of school quality, among other things, in primary education include the teacher-pupil ratio (Hewett et al, 2008). Based on education statistics yearbooks 2014/15-2019/20 respective school-years, the available data regarding the average ratio of the number of students enrolled annually and total teachers per year (tables 1, 2, 3 and Appendix Ia) in the particular years has been obtained as 36±4. According to the International Task Force on Teachers for Education 2030 referenced by UNESCO (2021), the student-teacher ratio has been coming down lately in primary education in sub-Saharan Africa, but is still comparatively high. The report says that when you add it all together, the student-trained teacher ratio is currently high at the primary level, in comparison to the rest of the world (Eurostat, 2021), which means fewer one-to-one student-teacher contact times and a lower standard of quality education.

Concerning the disparity distribution of schools in the nine regions concerning the seven school-years examined (32±1, 128±11, 27±4, 23±3, 96±11, 122±37, 106±14, 54±4, 66±4), the significant difference among the regions in a given year could be due to the influence of additional factors such as the dispersal of population through regions in which people gravitated into the towns along the tarmac road had knock-off effect on the salaries of the teachers' variations and the number of students per school (Figure 4 and 5). To the extent that the overall public and private schools' distribution is concerned, though, as mentioned above, there is no difference between them in management and cost per child, we found that there is a significant gap of almost three-fold between the types of schools (Figure 2 & 4). As to the supply of teachers in the nine regions as to school-years, there has been a great deal of disparity in the

distribution of teachers in a given region, and that has a correlation with the distribution of schools and other factors discussed above, such as the site of the schools. The Barri, Karkar, Nugal, and Mudug regions are more populated than the rest of the off-tarmac road regions (Figure 4).

Lastly, investments in schooling are critical in individual-com-societal poverty alleviation, particularly for the marginalised groups and women's emancipation through the *Millennium Development Goals*. Based on the findings and other similar researches, school fees could be a potentially significant impediment and ought to be eliminated or subsidized by meeting indirect costs such as expenses on text and notebooks, tuition fees, itinerant to school, school dress and examination fees for a push to universal schooling (Hewett *et al*, 2008, Sulochana, 2015, UNESCO, 2020). The school affordability and average cost per child/student per month in Puntland have been observed, based on the findings in this research, as $29±7 for each child per month. It is worth noting that there has been no discernible difference in overall fees and indirect costs per child across the nine regions. Thus, as per the low average family income/expenditure of $288/month and the mean number of school-reached children in a household, due to the affordability constraint, it could be inferred that the precipitous cost of sending children to school explains firstly, the low enrolment-ratios against school-reached children, and secondly, the huge dropouts and failure of 95% of the recruited students to reach year eight generalized examination (tables 1 to 5 and Appendix Ia & Ib).

CONCLUSIONS AND RECOMMENDATION

As far as qualitative and quantitative literature research on school improvement and effectiveness is concerned, a conceptual framework that identifies basic components while also governing school efficiency has to be articulated. Drawing from the Sub-Saharan African literature, a detailed plan to improve the quality of primary education, to conduct situation analyses and sector work on school excellence, and to monitor and evaluate educational reforms is to be formulated periodically (Heneveld, 1994). As it stands, the Puntland federal state of Somalia, or Somalia in general, for that matter, will not have sufficient financial resources to meet SDG 4 targets. The capacity of the country to achieve sustained economic growth to meet the future needs of education financing, international and regional organizations must first come up with lasting strategies, at least to better regulate both public and private schools. Second, to either foot the direct cost of school fees for public schools or meet indirect costs, such as the cost of books, stationery, examination fees, transportation, uniforms, and bags, in order to alleviate the burden of unaffordability for low-income families and make access to primary education more inclusive (Chikoko and Mthembu, 2021; Sulochana, 2015). Also, the government could explore public-private partnerships in the direction of future education financing. Enhancing the number of qualified primary teachers is needed for children & youth to access quality education and, at the same time, close the gap in teacher-student ratio. Albeit Sub-Saharan Africa is associated with the lowest ratio of female teachers in primary education (50%) (UNESCO, 2021), the percentage of female teachers (13%) is extremely alarming and merits immediate attention as woman teachers have an affirmative impact on girls enrolling and subsequently enduring in school. Likewise, learning and teaching policies, curriculum and learning assessments ought to be revisited to first identify the root cause of the high dropout rate, and secondly, remedy it. To formulate an adaptable calendar and timetables, arrange for temporary learning spaces along passage routes, transportable libraries, and supportive interactive audio tuition for the nomadic

children. In addition, delivering a specific curriculum for basic education in a fast-tracked arrangement through an adaptable timetable (Unicef, 2021). Finally, due to the COVID-19 pandemic and the disruption of the educational stage, the ministry of education and its international partners, in addition to digital video lessons education and its mobile phone application, ought to come up with a learning platform for children, particularly those in nomadic settings and financially unable to access the digital technology platforms, to be able to access lessons in line with the official curriculum and not become victims of the COVID-19 pandemic.

Disclaimer: There are no competing interests to declare

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APPENDIX Ia

Year	Region	Schools			Teachers					Student teacher ratio	Student - classroom ratio
		Total	public	private	Total	M	%	F	%	Term/y/ttteach/y	
2014/15	Cayn	33	25	8	195	182	93.3%	13	6.7%	37±4:1	41:1
	Bari	136	78	58	1,091	970	89%	121	11.%	--	--
	Gardafu	22	21	1	71	68	95.8%	3	4.2%	--	--
	Hayland	20	16	4	142	122	84.1%	20	15.9%	--	--
	Karkar	101	65	36	479	414	86.4%	65	13.6%	--	--
	Mudug	82	66	16	615	536	87.1%	79	12.9%	--	--
	Nugal	90	68	22	599	474	97.5%	12	2.5%	--	--
	Sanag	51	28	23	324	268	82.7%	56	17.3%	--	--
	Sool	70	53	17	454	390	85.9%	64	14.1%	--	--
Total		**605**			**3970**						
2015/16	Cayn	32	25	7	195	179	91.7%	16	8.2%	37±2:1	44:1
	Bari	137	78	59	1,040	913	87.8%	127	12.2%	--	--
	Gardafu	24	21	3	85	82	96.4%	3	3.6%	--	--
	Hayland	20	16	4	141	120	85%	21	15%	--	--
	Karkar	101	65	36	488	424	86.9%	64	13.1%	--	--
	Mudug	84	66	18	667	577	86.5%	90	13.5%	--	--
	Nugal	99	61	31	638	507	79.5%	131	20.5%	--	--
	Sanag	52	28	24	310	266	85.8%	44	14.2%	--	--
	Sool	68	53	15	448	384	85.7%	64	14.3%	--	--
Total		**617**			**4012**						
2016/17	Cayn	32	30	2	197	175	88.8%	22	11.2%	36±3:1	37:1
	Bari	134	117	17	1045	931	89%	114	11%	--	--
	Gardafu	25	20	5	88	87	98.9%	1	1.1%	--	--
	Hayland	20	15	5	139	122	87.8%	17	12.2%	--	--
	Karkar	113	69	44	585	482	82.4%	10	17.6	--	--

								3	%		
	Mudug	113	82	31	813	687	84.5%	126	15.5 %	--	--
	Nugal	100	94	6	729	571	78.3%	158	21.7 %	--	--
	Sanag	51	48	3	321	254	79.1%	67	20.9 %	--	--
	Sool	65	63	2	393	338	86%	55	14%	--	--
Total		**653**			**4310**						
2017/18	Cayn	31	27	4	288	244	84.7%	44	15.3 %	32±1:1	46:1
	Bari	109	30	79	948	824	87%	124	13%	--	--
	Gardafu	32	28	4	180	168	93.3%	12	6.7%	--	--
	Haylan d	24	12	12	125	115	92%	10	8%	--	--
	Karkar	84	74	10	636	523	82.2% %	113	17.8 %	--	--
	Mudug	133	55	78	1066	918	86.1%	148	13.9 %	--	--
	Nugal	104	79	25	749	622	83%	127	17%	--	--
	Sanag	57	13	44	389	338	86.9%	51	13.1 %	--	--
	Sool	63	14	49	425	374	88%	51	12%	--	--
Total		**637**			**4806**						
2018/19	Cayn	33	31	2	257	230	89.5%	27	10.5 %	42±3:1	45:1
	Bari	123	86	37	1055	968	91.8%	87	8.2%	--	---
	Gardafu	27	26	1	111	106	95.5%	5	4.5%	--	---
	Haylan d	26	16	10	188	169	89.9%	19	10.1 %	--	---
	Karkar	84	83	1	508	408	80.3%	100	19.7 %	--	---
	Mudug	139	105	34	928	796	85.8%	132	14.2 %	--	---
	Nugal	111	107	4	668	546	81.7%	122	18.3 %	--	---
	Sanag	55	53	2	317	264	83.3%	53	16.7 %	--	---
	Sool	60	60	0	362	313	86.5%	49	13.5 %	--	---
Total		**658**			**4,394**						
2019/20	Cayn	32	32	0	258	223	86.3%	35	13.6 %	32±4:1	
	Bari	131	91	40	1183	1074	90.8%	109	9.2%	--	
	Gardafu	30	29	1	108	101	93.5%	7	6.5%	--	
	Haylan	26	26	0	197	175	88.9%	22	11.1	--	

	d								%		
	Karkar	91	86	5	550	453	82.4%	97	17.6 %	--	
	Mudug	178	126	52	1137	956	84%	181	16%	--	
	Nugal	130	127	3	887	741	83.5%	146	16.5 %	--	
	Sanag	60	60	0	370	305	82.4%	65	17.6 %	--	
	Sool	71	60	11	451	392	86.9%	59	13.1 %	--	
Total		**749**			**5141**						

Table 6: The number of public and private schools, teachers by region and genders. Also, student teacher ratio & student classroom ratio. Ministry of Education (2014). Education statistics year book. pp 45,52. Ministry of Education (2015). Education statistics year book Pp 50,52. Ministry of Education (2016). Education statistics year book. pp 46, 49. Ministry of Education (2017). Education statistics year book. pp 42, 47. Ministry of Education (2018). Education statistics year book. pp 39, 45. Ministry of Education (2019). Education statistics year book. pp 53, 59. Ministry of Planning, economic development and international cooperation (2020). Puntland Facts and figures. department of statistics. Pp 20.

APPENDIX Ib

Region	School fee per student		Other learning expenses per child					Average Household expenditure per year/month
	School	Fees/student($)	Bus fees /child	fees for midterm and final exams ($)	Exercise books	Text books	Cost per items in ($)	2019
Cayn	1 2 3	10 10 10	N/A	4 4 4	1 0.5 0.5 0.5 0.5 0.5 0.5	Math Somali Social studies Islamic studies Arabic Science English	3 3 3 3 3 3 7	$3,461.96 288.5/month
Bari	School 1 2 3	25 15 20	N/A	4 4 4	1 0.5 0.5 0.5 0.5 0.5 0.5	Math Somali Social studies Islamic studies Arabic Science English	3 2 2 2 2 2 2	$3,461.96

Gurdafui	School 1 2 3	14 18 10	N/A	4 4 4	1 0.5 0.5 0.5 0.5 0.5 0.5	Math Somali Social studies Islamic studies Arabic Science English	3 3 3 3 3 3 5	$3,461.96
Highland	School 1 2 3	12 14 10	N/A	4 4 4	1 0.5 0.5 0.5 0.5 0.5 0.5	Math Somali Social studies Islamic studies Arabic Science English	3 3 3 3 3 3 7	$3,461.96
Karkar	School 1 2 3	14 15 18	5 5 5	6 6 6	1 0.5 0.5 0.5 0.5 0.5 0.5	Math Somali Social studies Islamic studies Arabic Science English	2 2 2 2 2 2 7	$3,461.96
Mudug	School 1 2 3	15 12 11	10 10 10	4 4 4	1 0.5 0.5 0.5 0.5 0.5 0.5	Math Somali Social studies Islamic studies Arabic Science English	4 4 4 4 4 4	$3,461.96
Nugal	School 1 2 3	20 25 13	10 10 10	4 4 4	1 0.5 0.5 0.5 0.5 0.5 0.5	Math Somali Social studies Islamic studies Arabic Science English	4 4 4 4 4 4 8	$3,461.96
Sanag	School 1 2 3	14 14 12		4 4 4	1 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Math Somali Social studies Islamic studies Arabic Science English	3 3 3 3 3 7	$3,461.96

Sool	School 1 2 3	10 10 10		4 4 4	1 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Math Somali Social studies Islamic studies Arabic Science English	3 3 3 3 3 7	$3,461.96

Table 7: Primary education student school fees, other learning expenses such as Bus fees /child, fees for midterm and final exams, exercise books, text books. The household expenditure per school-year (8 month). Source: Ministry of Planning, economic development and international cooperation (2019). statistical release gross domestic production. pp 9.