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Demographic Features and Mathematics Performance of Students: A case of G.C.E O/L Students in Ratnapura Educational Zone

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ABSTRACT

The present study attempts to examine the effect of demographic characteristics and students' attitudes on the mathematics performance of G.C.E. O/L students in Sri Lanka. Data were collected from 110 students who sat for the 2019 G.C.E. O/L examination, in Ratnapura Educational Zone in Sri Lanka. A structured questionnaire was used for data collection as a google form. ANOVA, t-tests, correlation tests, and descriptive statistics were employed for the data analyzing process. The results indicated that there are significant associations between mathematics performance and the demographic factors: residence, school type, parents' educational level, and father's occupation while the remaining factors: gender, mother's occupation, family income, and number of family members didn't show significant relationships with mathematics performance. Results revealed a strong and significant association between mathematics performance and attitudes of students towards mathematics. Thus, the study provides empirical evidence which will support education officials, teachers, parents, and students to plan for achieving a higher performance in mathematics of G.C.E. O/L students.

1. Introduction

Mathematics is possible to develop students' ability to think over quantitative terms [1]. It also enhances skills such as analytical and problem-solving skills [1]. As stated by Ajisuksmo and Saputri [2], mathematics is constructive in helping students to think and understand other areas of study and to be clever to think within logical, analytical, systematical, critical, and creative manners. Andamon and Tan [3] claim that mathematics is quite important and useful for all every day as well as it is used to solve problems in areas such as astronomy, business, computer science, technology, economics, navigation, physics, including statistics. Mathematics especially equips students with a uniquely powerful set of tools including logical reasoning, problem-solving skills, as well as the ability to think in abstract ways, to understand and change the world. ~~A~~ll most all the learning students should be able to understand, make sense of, practice and apply mathematics. Mathematical competencies can give better chances of employability, higher wages, and higher on-the-job productivity when the individual is employed. Hence, during the last two decades or so there has been increased interest in the role of detecting affective factors in the learning of mathematics [4]. Ismail and Awang [5] also declare that mathematics learning and students' performance in mathematics receive considerable attention from teachers, parents, governments, educational institutions and it is therefore, important to identify and recognize the factors that could influence students' mathematics performance.

In the Sri Lankan context, the education curriculum includes mathematics as a compulsory subject that every student has to go through in their education path starting from primary education to secondary education. General Certificate of Ordinary Level (G.C.E. O/L) examination is a major national examination that helps to select students for General Certificate of Advanced Level (G.C.E. A/L) education. There, only the students who obtain a pass for Mathematics will have the chance to gain further education till the next national examination, G.C.E. A/L which is the final examination of a student in his/her school life. Those who are failed in the subject have to give up their schooling. However, they have one more chance to sit for mathematics where the same rule is applied on getting passed. For the reasons of mathematics being a core and compulsory subject, performance in mathematics in G.C.E. O/L is critical.

There has been an average pass percentage of 62%-67% for mathematics in previous years (Nearly, 550,000 students sit for the O/L examination in Sri Lanka per year). More than 33% of of them fail in Mathematics (Department of Examinations, Sri Lanka, 2019). Therefore, it is important to investigate the leading factors that can cause this situation of low performances in mathematics [6]. There is evidence to mention, demographic factors are the main concern affecting academic performance. Kim-Choi [6] has endorsed that demographic factors are noted as high predictors of students' mathematics achievement. Demographic factors are often identified in terms of gender, age, high school, language spoken as well as parents' details regarded to mathematics performance. According to White [7], several demographic factors have been recognized related to mathematics achievement. She focused on gender, family structure, and parents' educational level. Although some studies are there relating to demographic factors and academic achievement, only a very few studies have been done on demographic factors of students and mathematics performance. The variant 'attitude' is one of the most potent factors that is related to achievement. Unless on the demographic factors and mathematics performance, plenty of researches have been conducted on attitude and mathematics achievement relationship. Those studies have been carried out for the most part in Western countries including United States and United Kingdom, and South-East Asian countries including Malaysia. However, scholars have not given adequate attention to study this issue and there is no adequate empirical evidence regarding how both of these factors; demographic factors plus attitudes affect mathematics performance, particularly in the Sri Lankan context. Therefore, this study attempted to explore how the demographic factors and attitudes affect on mathematics performance of OL students in Sri Lanka.

This study is timely consequential at a national level because it provides evidence regarding a common issue related to students in the country. Only very few investigations had been made on the mathematics performance of OL students in the country. The matter of higher failure rates in OL mathematics has not been addressed with looking at influential causes. As previous researchers have not accurately measured and analyzed the situation, the present study tries to observe how demographic factors and students' attitudes affect their mathematics performance at the GCE OL examination.

Theoretical Background

Demographic Factors: According to Chen and Wu [8], the term 'demographic' literally means writing about people or studying population. Demographic factors are the specific information on people, on the whole including information on age, gender, religion, income, race, and other data. Moreover, they explain that the relevance of data will depend on the study's field. Studying demographic factors is the statistical study of human populations regarding various factors and characteristics, including geographical distribution, sex and age distribution, size, structure, and growth trends [9,10]. Vierra [10] defined demographic factors as, the factors which are used to describe the characteristics of an individual or a population; some commonly addressing demographic factors can be stated as race, age, income, marital status, and educational achievement among groups of people. A very simple exposition has been given to demographic factors as statistics dealing with human populations. Thus, including all the characteristics stressed in different definitions, Demographic factors can be defined as certain features of populations including gender, nationality, education attainment, school type, residence, income level, and parental education that also can be studied statistically.

Studies in Sri Lanka also found large disparities in students' performance between the three types of public schools – 1AB, AC, and Type 2. Parents' education is the literacy of parents of a student. It is mostly referred to as "home education" and the education level of parents can affect a student's academic performance. Literature does not provide an exact definition of these terms. However, occupation can be defined as the main work or job undertaken by the father, mother. Family income often called household income is the income shared by people living in the same household. The family income, which is directly joined with the economic status is strongly inferred to be a predictor of mathematics operation and achievement [11]. The family structure discussed under this is the number of persons living in the house [12].

Attitude: Attitude lies related to a psychological tendency that is being expressed by evaluating a particular entity or status together with some degree of favor or disfavor/ interest or boredom [13]. Krischler, Powell, and Cate [14] simply define attitude as a condition associated with a mental object. It is a state of a person that predisposes a favorable or unfavorable response to an object, person, or idea. However, Williams and Williams [15], come up with a more descriptive annotation on attitude, "evaluation constitutes a central, perhaps predominant, aspect of attitudes, attitudes are presented in memory, and affective, cognitive, and behavioral antecedents of attitudes can be distinguished, as consequences of attitudes". When comes to attitude towards mathematics, it is the

students' mental dispositions and feelings toward mathematics achievement, as related to their attitude towards success in mathematics, confidence in learning mathematics, mathematics anxiety, the usefulness of mathematics, and reflectance motivation in mathematics. Martino and Zan [16], define mathematics attitude as the disposition towards mathematics. Ajisuksmo and Saputri [2] explain attitude for mathematics by way of emotional response either positive or negative associated with mathematics, confidence to succeed in studying mathematics, and strategies in coping with mathematical problems. Thus, with this memoir, attitude can be defined as feelings, beliefs, and emotions a student has towards mathematics, in a negative, positive or neutral way.

Mathematics Performance: Mathematics is important for child development because it is strongly associated with science, technology, engineering, and mathematics performance, college enrollment, and adulthood outcomes. Thus, mathematics learning and students' activities in mathematics receive high attention from teachers as well as parents [5]. Mathematics performance is defined as accomplishing or achievement of specific goals, objectives set in any academic undertaking in basic mathematics. Identification of relevant quantities, encoding into an internal representation, mental comparisons, and calculations is the performance in mathematics [17]. The program for international student assessment states that mathematics performance is "the mathematical literacy to formulate, employ and interpret mathematics in a variety of contents to describe, predict and explain phenomena, recognizing the role that mathematics perform in the world". Pietsch, Walker, and Chapman [18] define mathematics performance as the average scores of children for modules such as mathematics literacy and advanced mathematics scores. Summarizing the ideas of many authors, mathematics performance can be simply but smartly referred to as the student's mathematics-related ability as a subject.

3. Hypotheses

The study is primarily intended to study whether there is an association or effect of demographic factors and attitudes, towards the mathematics performance of O/L students. Literature provides evidence for many factors that cause students' mathematics achievement during schooling. Demographic factors can be introduced as a common indicator of several items. Most probably, these factors cannot be controlled by the students. When comes to attitudes, they are related conditions of students' minds and skills. Attitudes can be controlled or changed. These controllable and uncontrollable factors can make influences students' performance in mathematics. Thus, the study adopts mathematics performance as the dependent variable while considering demographic factors and attitudes as independent variables.

Demographic Factors and Mathematics Performance: Looking over the relationship between affective factors and learning mathematics is not simple. Researchers have found that students' demographic characteristics, such as the educational level of parents and parents' income, had a positive impact on their math ability. He has examined nationality, geographical region, school type, parents' education, and parents' career as demographic characteristics. Tahir [1] has carried out a study on the relationship between mathematics ability and demographic factors: gender, institutions, secondary education. Gender has been the highly concerned demographic factor when considering associations. A gender gap has been found between females and males related to mathematics by Kim-Choi [6]. However, White [7], expresses that student gender cannot be taken as a strong predictor of mathematics performance. This gender gap also does not reveal the same results by all the scholars. Many types of research can be found studying gender, family income, and parental education regarding demographic factors. Remali, Ghazali, Kamaruddin and Kee [19] express that demographic factors can be the main concern affecting academic performance. Differences in students' demography manifest in motivation to learn sciences and impact on performance in subjects among secondary school students in Sri Lanka [20]. According to Kim-Choi [6], demographical variables are useful in predicting the math achievement of students. The demographic factors: gender, socio-economic status, parents' educational level can predict students' mathematics ability [11]. Considering the above views on demographic factors on mathematics performance it is assumed that demographic factors will correlate with mathematics performance. Therefore, it is hypothesized that;

H1: There is a significant relationship between demographic factors and the mathematics Performance of OL students in Sri Lanka.

Attitudes and Mathematics Performance: A vast amount of researches report that attitude towards mathematics impacts the achievement in a subject. Generally, attitudes are directed towards something (in here, mathematics), are seen as either positive or negative, and are grounded in experience [21]. Student attitude has been an agent that is known to influence students' attainments in mathematics [13]. However, it can say that students' attitudes towards mathematics are highly subjective and vary among the students. Hyde et al [22] have found that those who are somewhat more confident about their math

abilities are more positive in their attitudes towards mathematics. The relation of attitudes for mathematics has been highlighted by Williams and Williams [15]. Grootenboer and Hemmings [3] state that there is an assumption stating positive mathematical attitudes and feelings will lead to increased mathematics achievement. Hyde, Fennema, Ryan, Frost and Hopp [22] come up with a finding stating individual's attitude affects their performance in math. Ajisuksmo and Saputri [2] in their research on the Influence of Attitudes towards Mathematics, and Metacognitive Awareness on Mathematics Achievements, reveal that there exists a significant connection between attitudes and mathematics performances. But, Tahir [1] argues that students are much neutral regarding their attitude towards mathematics and achievement on it. The studies have also shown that students' attitudes towards problem-solving - in terms of patience, confidence and willingness have a positive relationship with students' mathematics achievement [1]. At vary with this background, it is hypothesized that;

H2: There is a significant relationship between Attitudes and Mathematics Performance of O/L students in Sri Lanka.

4. Material and Methods

The research aims to explore the association between demographic factors and attitudes and the mathematics performance of G.C.E. O/L students. The quantitative method has been employed to study the research problem. Primary data were used in the analysis to evaluate the hypotheses. The population was the students who sat for the G.C.E. O/L examination held in December 2019. As the population is dispersed over a wide geographic region, the respective sample was selected with a multi-stage sampling procedure. Sabaragmuwa province was ramdomly selected first out of the 9 provinces in Sri Lanka and agin Ratnapura district was selected randomly. Then the Ratnapura Education Zone was selected randomly and the sample was determined using a simple random sample of students who sat for G.C.E. O/L in 2019 from the Ratnapura Education Zone. Though the sample size was 367 selected from over 6825 students in the education zone, which was decided following the sample size determination table developed by Krejcie and Morgan in 1970 [23], only 110 G.C.E. O/L students have responded for the questionnaire.

The survey was conducted with a structured questionnaire; a google form for the convenience of distribution. The questionnaire was developed using two step procedures. Initially, it was designed by carefully selected items reviewing literature for all dimensions in constructs. Then a pilot survey was conducted priory to the original questionnaire in order to identify whether the questionnaire is fitted to achieve the research problem, whether it is understood by the respondent as well as whether it is clear and accurate to gather relevant data. This process assisted in enhancing and confirming both validity and reliability of data.

The dimensions of the independent variable demographic factors which were also suggested by the literature: 1-gender, 2-residence, 3-school type, 4-parents' highest education, 5-father's occupation, 6-mother's occupation, 7-monthly family income and 8-number of family members were employed. These were measured asking eight questions covering all the aspects. T tests and ANOVA tests were computed for observing the relationship, the demographic factors had with the mathematics performance. The other independent variable, attitude was determined by the Attitude towards Mathematics Indicator (ATMI) developed by Lim & Chapman [24]. ATMI is a forty question, four factor survey which has been especially designed for measuring attitude towards mathematics. The factor structure of the ATMI covers the domains of attitudes toward mathematics, providing evidence of content validity. The inventory is composed of four subscales. In this study, ATMI is shortened (SHORT ATMI) according to the need of the research, so that it has 12 questions in total. Accordingly, the four sub-scales and their number of items are i) self-confidence in mathematics (3 items), ii) perceived value of mathematics (3 items), iii) mathematics enjoyment (3 items), and iv) mathematics motivation (3 items). The 12 variables on ATMI were measured on the five-point Likert Scale by relating to the students' attitudes towards mathematics.

Scores of attitudes towards mathematics are the total score of the four sub-scales in ATMI. The first domain describes students' self-esteem and self-concept on their mathematics ability, the second domain describes students' beliefs on usefulness, relevance, and value of mathematics in life, the third domain talks about the pleasure of students in learning mathematics and the final domain describes students' willingness to further study mathematics and interest towards mathematics. ATMI is a five-point Likert scale ranging from strongly disagree, disagree, neutral, agree to strongly agree. The students were asked to select their degree of agreement with the 12 statements. ATMI scores were taken by summing up the entire item contained in ATMI subscales. The components in ATMI were tested especially for reliability because attitudes were tested in a Likert scale procedure. Chronbach's alpha statistic was used for that. The data were used

for the analysis after the confirmation of reliability and consistency in data. In order to measure the study's dependent variable - the mathematics performance of students, the students' term tests marks were taken. Marks obtained for mathematics subject at the six school term tests (3 terms in grade 10, 3 terms in grade 11) were added together and obtained the average marks of each student.

ANOVA tests, T-tests, and Pearson correlation tests which are basic and common statistical tools were used to test the hypotheses especially as those tests are designed for examining the correlations, effects and associations between variables. Descriptive statistics were used other than the above tests. The tests helped to investigate the correlations and significance of correlations between the independent variables: demographic factors, attitudes and the dependent variable, mathematics performance. The Statistical Package for Social Sciences (SPSS – 21) and Minitab (Version 17) were used to analyze data.

5. Results and Discussion

Table 1 shows demographic characteristics of students who participated in the study, in terms of gender, residence, school type, parents' highest education level, father's occupation, mother's occupation, monthly family income, and number of family members. The percentage of girls in the sample is higher than boys. The percentage of students representing the three school types represents the national level composition of the criterion. At the national level, the percentage of students in the 1 AB school category is the highest.

Gender and Mathematics Performance: To test if there was a significant difference in mathematics performance between males and females, the independent sample *t*-test was applied. Table 2 shows the results. As shown in the table, males' mathematics performance is higher than that of the girls. Here, the homogeneity of variances assumption was met as assessed by Levene's test of equality of variances, but the *p*-value (>.05) of the *t*-test was insignificant. Therefore, even though males are having high performance than girls, there is no statistically significant difference in mathematics performance between males and females. The difference is slight.

Residence and Mathematics Performance: The independent sample *t*-test was run to see if there was a significant difference in students' performance in mathematics concerning residence. The results are given in Table 2. Students living in urban areas have achieved a higher mathematics performance than those who are living in rural areas. The *t*-test confirms that the difference in mathematics performance between students living in urban areas and students living in rural areas is statistically significant.

Table 1: Demographic Characteristics of Students

		Frequency	Percentage
Gender	Male	54	59
	Female	38	41
Residence	Rural	64	70
	Urban	28	30
School Type	1 AB	85	91
	1 C	6	7
	Type 2	1	1
Parents' Highest Ed	O/L or below	28	30
	A/L	47	51
	Degree/ higher	17	18
Father's Occupation	No job	5	5
	Labor	29	32
	Government sector	22	24
	Private sector	21	23
	Business	15	16
Mother's Occupation	No job	60	65
	Labor	4	4
	Government sector	20	22
	Private sector	3	3
	Business	5	5
Monthly Family Inc.	<=3500	27	29
	35000-50000	24	26
	50000-75000	14	15
	75000-100000	9	10
	>=100000	18	20
No. of family me.	Less than 4	6	7
	4	46	50
	5	25	27
	More than 5	15	16

Source: Survey Data, 2021.

Table 2: Two-sample T for Mathematics Performance

	T test			Significance	
	N	Mean	SD	SM	T	P
Gender					(0.30)	0.77
Female	54	71.5	21.7	3.0		
Male	38	72.7	17.9	2.9		
Residence					(2.35)	0.02
Rural	64	69.0	20.5	2.6		
Urban	28	78.9	17.7	3.4		

School Type and Mathematics Performance: Students of 1AB schools outperformed their counterparts in both 1C and Type 2 schools. To find if there is a statistically significant difference in students' mathematics performance between the three school types, a one-way ANOVA was run. The results are presented in Table 3. The p-value of the test revealed that the difference between mathematics performance of students of Type 1AB, Type 1C, and Type 2 is significant (<.05).Table 4 depicts the high performance of 1AB school category students when compared to the other school categories' students.

Parents' Highest Education Level and Mathematics Performance: Table 3 clearly shows that parents' education levels appear to affect their children's mathematics ability of their children. An ANOVA test was used to check whether the students' mathematics performance differs between their parents' education level; the highest education level of either mother or father. Further testing confirmed that the attained differences were statistically significant. Tukey's Post Hoc test was applied to identify the pairs, which were significantly different from each other. Those pairs are shown in Table 4. Statistically significant differences in mathematics performance were observed between students whose parents have gained education up to O/L and whose parents have completed degrees and had higher studies.

Father's Occupation and Mathematics Performance: To test how the differences can be seen between mathematics performances of students according to their fathers' occupations, an ANOVA test was run. Table 3 depicts the output. The *p*-value (<.05) of the ANOVA test indicated that there is a statistically significant difference between students' mathematics performance, relating to their fathers' occupation.Tukey's test showed that a considerable difference is there between the mathematics performance of children of the labor sector and government sector fathers. The statistics and results are shown in Table 4.

Table 3: Analysis of Variance

Source	Value				
	DF	SS	MS	F	P
School Type	2	4490	2245.1	6.18	0.003
Error	89	32357	363.6		
Total	91	36847			
Parents' Highest Ed	2	3488	1743.9	4.65	0.012
Error	90	33360	374.8		
Total	91	36847			
Father's Occupat -ion	4	4038	1009.6	2.68	0.037
Error	87	32809	377.1		
Total	91	36847			
Mother's Occupat -ion	4	1121	280.3	0.68	0.606
Error	87	35726	410.6		
Total	91	36847			
Monthly Family Inc.	4	2528	632.1	1.60	0.181
Error	87	34319	394.5		
Total	91	36847			
No. of family me.	3	364.4	121.5	0.29	0.830
Error	88	36482.9	414.6		
Total	91	36847.3			

Mother's Occupation and Mathematics Performance: To test how is the difference between students' mathematics performance and their mothers' occupation, an ANOVA test was used. The obtained results are illustrated below in Table 3. It depicts that the Mother's occupation is not significant enough to decide the children's mathematics ability and performance. The Tukey's test, Table 4 also gives the relevant results as there are no differences between any group of students whose mothers are doing different types of occupations (or not doing any job).

Monthly Family Income and Mathematics Performance: An ANOVA test was used in order to test whether the family income influences students' mathematics performance. This is the economic status of the students and their families. The ANOVA test results as shown in Table 3 says that there is no statistically significant difference between the family income levels and mathematics performance of students. Table 4 shows that the

mathematics performance of students of all income levels do not show significant differences. The mathematics performance cannot be predicted with the monthly family income of students.

Table 4: Tukey's Test results

			Grouping	
	N	Mean		
Parents' Highest Edu				
Degree/Higher	17	83.08	A	
Up to A/L	47	72.16	A	B
Up to O/L or Grade 10/9	28	64.93		B
Father's Occupation				
Government sector	22	82.88	A	
Private sector	21	71.88	A	B
Business	15	70.51	A	B
No job	5	67.6	A	B
Labor	29	65.29		B
Mother's Occupation				
Private sector	3	77.4	A	
Government sector	20	76.93	A	
No job	60	71.10	A	
Labor	4	68.1	A	
Business	5	62.63	A	
Monthly Family Inc.				
75000-100000	9	83.61	A	
>=100000	18	77.27	A	
35000-50000	24	70.87	A	
50000-75000	14	69.20	A	
<=3500	27	67.00	A	
No. of family me.				
Less than 4	6	73.50	A	
4	49	73.32	A	
5	15	72.07	A	
More than 5	22	68.52	A	

The number of Family members and Mathematics Performance: The number of family members sometimes can affect students' mathematics performances. To test whether there is a relationship or there is a statistically significant differences between students' mathematics performance and the number of their family members, an ANOVA test was applied. It specifies that the mathematics performances are not much different between either students who have fewer family members or more family members in their houses. Table 3 showing statistics indicates that the difference is not statistically significant. The Tukey's test also proves it further as shown in Table 4.

Attitudes and Mathematics Performance: The Attitude towards Mathematics Inventory (ATMI) consists of four categories, i.e.: self-confidence in mathematics, the perceived value of mathematics, mathematics enjoyment and mathematics motivation. Each sub-scale consisted of 3 items. The internal consistencies of the items are as follows in Table 5

Table 5: Attitude towards Mathematics Inventory

Sub-Scale	ATMI		Correlations		
	N.Item	Item	Cron. α	Pears .Corr	P-Value
Self-confid.	3	1,2,3	0.800	0.952	0.000
Value	3	4,5,6	0.711	0.845	0.003
Enjoy.	3	7,8,9	0.727	0.907	0.000
Motiv.	3	10,11 ,12	0.700	0.892	0.002

The analysis of correlation among variables in the ATMI and mathematics performance was executed through the Pearson Correlation test since this study is intended to observe the association between attitude towards mathematics and mathematics performance. The Pearson Correlation of ATMI & Mathematics Performance was 0.960 with a P-value of 0.000.

Accordingly, the results of the study show that there is neither any significant relationship between gender and mathematics performance nor any significant effect of gender on mathematics performance. As the table depicts, the p-value of the *t*-test is 0.767. This means the difference in gender, being a girl or a boy does not noticeably matter on anyone's ability in mathematics. T-statistic value, 0.30 is less than 1.98 suggesting that the mathematics performance of the two groups is equal for the most part. This result is relevant to the prior study [2], it also says that there is no significant difference in mathematics achievement between male and female students. They had found that gender was shown to be a statistically significant influence with the mathematical achievement of females lower than that of the males. The performance gap between rural students and urban students could be seen significantly. The p-value of 0.022 and T-test value of -2.35 indicate that the difference is highlighting. The means obtained through the tests show that students who live in

urban areas have high performances than rural students. Wide gaps in students' performance towards mathematics are found between school categories. The mean of performance of students in the three school types differs with large gaps. However, students in the 1AB category perform very well than the students in other school categories. Students of all levels of ability in the case study follow the same mathematics curriculum offered by all categories of public schools. In Sri Lanka, children are entitled to get admission to public schools closer to their residence. However, 1 AB schools enroll a group of students at grade 6, who perform well in the national level examination - the grade 5 Scholarship Examination. The average number of students in 1 AB-type school is considerably high compared to the other school types. The government has taken special actions to develop infrastructure facilities in selected 1 AB all over the country, even though per-pupil expenditure on public schools is the same. Therefore, 1 AB schools are well-equipped compared to the other school categories, with more facilities for students to learn. It may be the reason behind this wide gap in performance.

It certifies the findings of De Silva and Khatibi [21], which states the provision of school resources affects the development of students' performance to a lesser extent in both developing and developed countries. Parents' education level also has significant effects on the students' mathematics performance. ($P = 0.012 < \alpha$). Results reveal not only the significant association but also there exists a positive relationship between parents' level of education and their students' mathematics accomplishment. Higher the parents' education level, the higher the student's mathematics performance and vice versa. This result tallies with the finding of Lal [12], parents' highest education level was the highest predictor of mathematics achievement of students in his case related to USA. According to the statistical outputs obtained here, there is a significant effect of fathers' occupation on their children's mathematics performance. The p-value 0.037 of ANOVA and the mean values obtained at the pairwise comparisons show the discrepancy of mathematics performances of students compared with their fathers' jobs. When looking at the mother's occupation, the results are opposite to the fathers' situation. Though the father's occupation results in students' mathematics performance, the mother's occupation does not. There is a positive relationship between a mother's career type and students' confidence in learning mathematics. But in accordance with this study, the insignificant p-value (0.606) discloses that the effect of a mother's job is not important for children's mathematics abilities. Even though the pairwise comparisons states the means in the way that students of mothers who works in private sectors perform very well in mathematics, the results are not considerable. Family income is very critical for most things. According to the study, family income can do nothing substantial on students' mathematics performance. The 0.181 p-value, as well as the Tukey's test's results, give out that even the low-income students can perform well as high-income level students. It cannot be observed that there are considerable differences in achievements related to mathematics between the corresponding income levels they have been categorized into. This finding is divergent from the findings of White [7] as he has found family income is significantly associated with math achievement. However, students in high-income families may score more due to the reason that they are able to acquire many educational sources by spending more money. The number of family members also is not shown to be significant towards students' mathematics performance. The p-value of 0.830 obtained through the test statistic indicates its insignificance. Whatever the number of family members, it does not influence much on students' mathematics performance. Yet, Terzi & Kirilmazkaya [25] discusses the association between academic achievement and the number of siblings. There he has found that a number of siblings can cause lower achievement due to limited opportunities because they have to share resources with other family members. Thus, H1 is considered in a way as follows (Table 6).

Table 6: Association between demographic factor and mathematics performance

Demo-graphic	Factor	Association	
		Signi-ficant	Insigificant
	Gender		Yes
	Reside.	Yes	
	School Type	Yes	
	Parents' High.Ed	Yes	
	Father's Occupation	Yes	
	Mother's Occupation		Yes
	Monthly Family Inc.		Yes
	No. of family me.		Yes

The outcomes of this study indicated that the independent variable attitudes towards mathematics highly contributes to the changes in students' mathematics performance. Therefore, H2 is

accepted. The scores obtained through ATMI on how about the attitudes of students produce a 96% correlation between attitudes and mathematics performance. It is a very strong positive association. It indicates that when the attitudes become more positive, the performance level rises up. This result conforms to many research findings stating that students' attitudes towards mathematics are best predictors of their mathematics performance which shows a significant positive relationship [2,3,7].

6. Conclusion

This study contributes to the literature by analyzing the causes for mathematics performance of O/L students by referring to multiple factors. The study has identified that residence, school type, parents' education, and father's occupation are considerably associated with the mathematics performance of O/L students in Sri Lanka. At the same time, gender, mother's occupation, family income, and the number of family members do not show noticeable relationships with mathematics performance. The other important finding is that students' attitude towards mathematics highly causes their performance in the subject. Although many scholars have different views on demographic factors and their dimensions regarding students, this study has ascertained that it is a multi-dimensional predictor. It encompasses students' parents', family, and regional features. Any study has not been conducted yet by considering eight dimensions related to demographic factors even with the help of the same test statistics. Although mathematics has traditionally been a masculine-stereotyped subject, this study reveals O/L students do not show significant differences as boys and girls, in the case of mathematics. Therefore, before concluding that changes in mathematics performance are generated by gender, educators and scholars need to be sensitive to the high correlation between attitudes towards mathematics as evidenced by current research.

There were recognizable effects from demographic factors; gender and family income on the mathematics performance of students. But the influences were not important at considerable levels. The study argues that positive relationships could exist without being significant. Hence, it was concerned about the significance of causal cognition among attitudes and mathematics performance. Based on the argument, results revealed that there remains a high significance between the two variables. Also, the study has used the measure Attitude towards Mathematics Inventory (ATMI) which has never been used by a Sri Lankan scholar previously for measuring attitudes of people. Moreover, finally, students' demographic factors and attitudes towards mathematics have significant impacts on their mathematics performances.

The results of the current study provide some useful findings and insights into the mathematics performance of O/L students of Sri Lanka. These results can contribute to the education decision-makers in administration as well as the students to develop their performances. The study reveals that parents' education can affect students' mathematics performance and literature shows it in all educational performances. Therefore, the current educational authorities can take necessary steps to improve the education level of present students, as they will be the next parent generation.

Regarding this study, it considered information of only 110 students as the available sample. The reason for this was the prevailed COVID-19 situation in the country which came across for data collection. It will be more successful if future researchers can use appropriate sample sizes to minimize generalization issues. Operationalization of the independent variable, demographic factors has been done only considering the students' aspect. This research was conducted regarding Ratnapura educational zone and especially researchers are encouraged to conduct this kind of experiment in different regions in different education, social and cultural environments, as this kind of study has not been conducted in sufficient contents. As some of the demographic factors' effects were insignificant, re-examining those relationships may help to confirm the results here. The educators must determine how to increase performance in such major subjects in a school curriculum, which can decide students' further and future education paths.

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