

How Demographic Features and Attitudes of Student Affect the Mathematics Performance of Students?

(With special reference to the Ordinary Level Students in Ratnapura Educational Zone in Sri Lanka)

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Abstract

The present study attempts to examine the effect of demographic characteristics and students' attitudes on the mathematics performance of Ordinary Level (OL) students in Sri Lanka. Data were collected from 110 students who sat for the 2019 OL examination, in Ratnapura Educational Zone in Sri Lanka. A structural questionnaire was used for data collection via 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 some 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 of mathematics of OL students.

Keywords: Attitudes, Demographic Factors, Mathematics Performance.

1. Introduction

Mathematics is possible to develop students' ability to think over quantitative terms (Tahir, 2009). It also enhances skills such as analytical and problem-solving skills (Tahir, 2009). As stated by Ajisuksmo and Saputri (2017), 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 (2018) 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. According to Michael (2015), almost 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 (Geary & Hamson, 2000). 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 (Grootenboer & Hemmings, 2007). Ismail and Awang (2007) 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 (GCE OL) education is a major national examination that helps to select students for General Certificate of Advanced Level (GCE AL) education. There, the students who obtain a pass for Mathematics will have the chance to gain further education till the next national examination, General Certificate of Education (Advanced Level) which is the final examination of a student in his/her school life. Those who fail 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 GCE-OL is critical.

There has been an average pass percentage of 62% - 67% for mathematics in previous years (Nearly, 550,000 students sit for the OL examination in Sri Lanka per year). More than 33% of students who sit for OL fail in Mathematics. Therefore, it is important to be concerned about the leading factors that can cause this situation of low performances in mathematics (Kim-Choi, 2015). There is evidence to mention, demographic factors are the main concern affecting academic performance (Kim-Choi, 2015). Kim-Choi (2015) 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 regarding mathematics performance. According to White (2001) 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 (Vierra, 2014), only a very few studies have been done on demographic factors of students and mathematics performance. In pursuit of Ma and Kishor (1997), the variant 'attitude' is one of the most potent factors that relate to achievement. Unless on the demographic factors and mathematics performance, plenty of research has been conducted on attitude and mathematics achievement relationship. Those studies have been carried out for the most part in Western countries including the United States (Schenkel, 2009), and United Kingdom (Odell & Schumacher, 2010), and South-East Asian countries including Malaysia (Kargar, Tarmizi, & Bayat, 2010). 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 and particularly in the Sri Lankan context. Therefore, this study attempted to explore how the demographic factors and attitudes affect the mathematics performance of OL students in Sri Lanka.

This study is timely and consequential at a national level because it provides evidence regarding a common issue related to students in the country. The paper is organized as follows; first, it reviews the literature on mathematics performance and its link with both demographic factors and attitudes. Based on the literature review, the hypotheses are formulated. Then the study describes the materials and related methods followed. Results are presented and discussed in the next section. Finally, the paper concludes by reviewing its findings, contributions, recommendations, limitations with providing directions for future research.

2. Literature Review

2.1 Demographic Factors

According to Chen and Wu (2009) 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 (American Psychological Association, n.d.). Vierra (2014) 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 by Global Educational publications (2020), 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.

Gender refers to the characteristics of women, men, girls, and boys that are socially constructed together with norms, behaviors, and roles associated with being a female, male, girl, or boy, and also relationships with each other. Gender issues have been a rich area, and probably initiated interest in research on the effect of gender on mathematics learning. Results indicate that progress has been made in studies on mathematics achievement over the past twenty-five years while former gender differences appear to be eroding and changing, there continues to be a concern that mathematics achievement needs to improve (White, 2001). The residence is the place where someone lives (Aydin, Topal, Sahin, & Sahin, 2008). The category of school is considered as the school type. Studies in Sri Lanka also found large disparities in students' performance between the three types of public schools – 1AB, AC, and Type 2 (National Education Research and Evaluation Centre, 2015). 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 (Slaughter, 2007). Literature does not provide an exact definition of these terms. However, it 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 (Saritas & Akdemir, 2009). The family structure is discussed under this; some persons live in the house (Lal, 2014).

2.2 Attitudes

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 (Mohamed & Waheed, 2011). Kruschler, Powell, and Cate (2019) 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 (Olson & Zanna, 2013). However, Williams and Williams (2010) 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 it 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 (Alibraheim, 2019). Martino and Zan (2001) define mathematics attitude as the

disposition towards mathematics. Ajisuksmo and Saputri (2017) 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.

2.3 Mathematics Performance

Mathematics is important for child development because it is strongly associated with science, technology, engineering, and mathematics performance, college enrolment, and adulthood outcomes (Principles and standards for school mathematics, 2000). Thus, mathematics learning and students' activities in mathematics receive high attention from teachers as well as parents (Ismail & Awang, 2007). Michael (2015) defined mathematics performance as the accomplishment or achievement of specific goals and set of objectives in any academic undertaken in basic mathematics. Identification of relevant quantities, encoding into an internal representation, mental comparisons, and calculations is the performance in mathematics (Musso, Kyndt, Cascallar, & Dochy, 2012). The Program for International Student Assessment (PISA) (2020) 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 (2003) 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.

Many studies have been conducted to investigate the impact of demographic factors and attitudes on the mathematics performance of students. Most of the researchers related to these facts pay attention to observing the relationship between demographic factors and mathematics performance, the relationship between attitudes and mathematics performance separately. Plural investigations try to combine various areas of demographic factors with mathematics performance. The studies have not observed the same results in the observations of attitude and mathematics performance. Most of the scholars study the attitudes and demographic factors, mathematics performance variables, but only a very few quests on the combined relationship between demographic factors, attitudes, and mathematics performance. Terzi and Kirilmazkaya (2020) study all these variables and their association. Their results were demographic factors: parental education, number of siblings, and preschool education directly affect mathematics performance while gender and computer ownership do not. According to that study, attitudes have a significant impact on mathematics performance.

3. Research Method

The research aims to observe whether there is an association of demographic factors and attitudes with the mathematics performance of O/L students. The reality of the outcome, whether there are significant relationships between the variables, cannot be predicted. This subjective relationship leads the reality to change constantly bringing out doubts. Some demographic factors and attitudes have chances of changing with time or with individuals. Thus, the research is identified as pragmatic. The outcome may be found in different viewpoints in different situations. In that manner, this cross-sectional study follows a mixed inquiry with a correlational design. The objective of this applied research can be pointed out as explanatory.

As mentioned above, the mixed method has been employed with a combination of both qualitative and quantitative forms to study the research problem. Primary data were used in the analysis to evaluate the hypotheses. The population of interest was the students who sat for the GCE-OL examination held in December 2019. As the population is dispersed over a wide geographic region, it was not feasible to conduct a sampling procedure covering the whole population. Therefore, the respective sample was selected with a multi-stage sampling procedure. Sabaragamuwa province was considered the first of the 9 provinces in Sri Lanka. Then Ratnapura district was selected. Then selected a simple random sample from the students who sat for Ordinary Level examination in 2019 that represented the Ratnapura Education Zone. It was decided to take 384 responses from over 15000 students in the area as the sample following the sample size determination table developed by Krejcie and Morgan in 1970. But, due to the prevailing COVID-19 situation in the country, the details of only 110 students could be obtained.

The data were collected in two forms: survey and case study. The survey was conducted with a 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 prior 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 the 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 by 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, the attitude was determined by the Attitude towards Mathematics Indicator (ATMI) developed by Lim & Chapman (2013). ATMI is a forty-question, four-factor survey which has been specially designed for measuring attitude towards mathematics. The factor structure of the ATMI covers the domain 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 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 measure on the five-point Likert Scale were related to the students' attitudes towards mathematics.

Scores of attitudes towards mathematics are the total score of the four subscales in ATMI. The first domain describes students' self-esteem and self-concept on their mathematics ability, the second domain describes student's 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 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 statistical tools were used to test the hypotheses. 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.

4. Findings and Discussions

Table 01 below 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 some 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.

Table 01. Demographic Characteristics of Students

Frequency			Percentage %
Gender	Female	54	70
	Male	38	41
Residence	Rural	64	70
	Urban	28	30
School Type	1 AB	85	92
	1 C	6	7
	Type 2	1	1
Parents' Highest Education	O/L or Below	28	30
	A/L	47	51
	Degree/ Higher Education	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 Income	<= 35000	27	29
	35000 - 50000	24	26
	50000 - 75000	14	15
	75000 - 100000	9	10
	>= 10000	18	20
Number of Family Members	Less than 4	6	7
	4	46	50
	5	25	27
	More than 5	15	16

Source: Survey Data, 2021.

4.1 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 02 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 higher performance than girls, there is no statistically significant difference in mathematics performance between males and females. The difference is slight.

Table 02. Two-sample T for Mathematics Performance

Gender	N	Mean	StDev	SE Mean
Female	54	71.5	21.7	3.0
Male	38	72.7	17.9	2.9
T-Value = -0.30 P-Value = 0.767				

4.2 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 the residence. The results are given in Table 03. 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 03. Two-sample T for Mathematics Performance

Residence	N	Mean	StDev	SE Mean
Rural	64	69.0	20.5	2.6
Urban	28	78.9	17.7	3.4
T-Value = -2.35 P-Value = 0.022				

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 04. 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 04. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
School Type	2	4490	2245.1	6.18	0.003
Error	89	32357	363.6		
Total	91	36847			

Table 05 depicts the high performance of 1AB school category students when compared to the other school categories' students.

Table 05. Means

School Type	N	Mean
1 AB	85	73.90
1C	6	51.5
Type 2	1	31.33

4.3 Parents' Highest Education Level and Mathematics Performance

Table 06 clearly shows that parents' education levels appear to affect their children's mathematics ability. 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

Table 06. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Parents Highest Education					
	2	3488	1743.9	4.65	0.012
Error	90	33360	374.8		
Total	91	36847			

Further testing confirmed that the obtained 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 07.

Table 07. Grouping Information Using the Tukey Method

Parents Highest Education	N	Mean	Grouping
Degree or Higher Education	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

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.

4.4 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 08 depicts the output. The p -value ($<.05$) of the ANOVA test indicated that there is a statistically significant difference between students' mathematics performance with related to their fathers' occupation.

Table 08. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Occupation of Father	4	4038	1009.6	2.68	0.037
Error	87	32809	377.1		
Total	91	36847			

Tukey's test showed that a considerable difference is between the mathematics performance of children of the labor sector and government sector fathers. The statistics and results are shown in Table 9.

Table 9. Grouping Information Using the Tukey Method

Occupation of Father	N	Mean	Grouping
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
Laborer	29	65.29	B

4.5 Mother's Occupation and Mathematics Performance

To test the difference between students' mathematics performance and their mothers' occupation, an ANOVA test was used. The obtained results are illustrated below in Table 10. It depicts that the Mother's occupation is not significant enough to decide the children's mathematics ability and performance. The Tukey's test as shown in Table 11 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).

Table 10. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Occupation of Mother	4	1121	280.3	0.68	0.606
Error	87	35726	410.6		
Total	91	36847			

Table 11. Grouping Information Using the Tukey Method

Occupation of Mother	N	Mean	Grouping
Private Sector	3	77.4	A
Government Sector	20	76.93	A
No Job	60	71.10	A
Laborer	4	68.1	A
Business	5	62.63	A

4.6 Monthly Family Income and Mathematics Performance

An ANOVA test was used in order to test whether family income influences students' mathematics performance. This is the economic status of the students and their families. The

ANOVA test output as shown in Table 12 indicates that there is no statistically significant difference between the family income levels and mathematics performance of students.

Table 12. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Monthly Family Income	4	2528	632.1	1.60	0.181
Error	87	34319	394.5		
Total	91	36847			

Table 13 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 13. Grouping Information Using the Tukey Method

Monthly Family			
Income	N	Mean	Grouping
75000 - 100000	9	83.61	A
>= 100000	18	77.27	A
35000 - 50000	24	70.87	A
50000 - 75000	14	69.20	A
<= 35000	27	67.00	A

4.7 A 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 difference 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 either student who have fewer family members or more family members in their houses. Table 14 showing statistics indicates that the difference is not statistically significant.

Table 14. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Number of Family Members	3	364.4	121.5	0.29	0.830
Error	88	36482.9	414.6		
Total	91	36847.3			

The Tukey's test also proves it further as shown in Table 15.

Table 15. Grouping Information Using the Tukey Method

Number of Families			
Members	N	Mean	Grouping
Below Four Members	6	73.50	A
Four Members	49	73.32	A
Above Five Members	15	72.07	A
Five Members	22	68.52	A

4.8 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 subscale consisted of 3 items. The internal consistencies of the items are as follows (Table 16).

Table 16. Attitude towards Mathematics Inventory

Subscale	Number of Items	Item numbers	Cronbach's α
Self - confidence	3	1,2,3	0.8008
Value	3	4,5,6	0.7112
Enjoyment	3	7,8,9	0.7267
Motivation	3	10,11,12	0.7003

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. Table 17 gives the results of Pearson correlation statistics.

Table 17. Pearson Correlation

Subscale of ATMI	Pearson Correlation	P-Value
Self - confidence	0.952	0.000
Value	0.845	0.003
Enjoyment	0.907	0.000
Motivation	0.892	0.002

All the subscales are significant in association with mathematics performance (p values > 0.05). Also, the Pearson correlations show that there are positive relationships. Not only the individual subscales but also the overall correlation of ATMI was significant showing a strong positive association between ATMI and mathematics performance of students. Results are given in Table 18.

Table 18. Correlation: ATMI, Mathematics Performance

Pearson correlation of ATMI and Mathematics Performance = 0.960
P-Value = 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 (Ajisuksmo & Saputri, 2017). It also says that there is no significant difference in mathematics achievement between male and female students, but differs from the results of the study carried out by Rothman, Slattery, Vranek, & Resnick (2002). They had found that gender was shown to be a statistically significant influence with the mathematical achievement of females lower than 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 highlighted. The means obtained through the tests show that students who live in urban areas have higher 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 (2017) which states the provision of school resources affects the development of student's 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 Kadriye (2005) revealing parents' highest education level was the highest predictor of mathematics achievement of students in his case related to the 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. This is parallel to the findings of McCoy (2010) as he has discovered that his father's occupation significantly contributed to mathematics performance. 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. Alibraheim (2019) has found that there is a positive relationship between a mother's career type and students' confidence in learning mathematics. 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 state the means in the way that students of mothers who work 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.

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 (2001) 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. A 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 (2020) 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 19).

Table 19. Association between demographic factor and mathematics performance

Demographic Factor	Association/ Effect
Gender	Not Significant
Residence	Significant
School Type	Significant
Parents' Highest Education	Significant
Father's Occupation	Significant
Mother's Occupation	Not Significant
Monthly Family Income	Not Significant
Number of Family Members	Not Significant

The outcomes of this study indicated that the independent variable attitudes towards mathematics highly contribute to the changes in students' mathematics performance. Therefore, H2 is accepted. The scores obtained through ATMI on how 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 of the researches done by the scholars such as Andamon & Tan (2018), Ajisuksmo & Saputri (2017), Schenkel

(2009), and White (2001). It shows up that students' attitudes towards mathematics are the best predictors of their mathematics performance which shows a significant positive relationship.

5. Conclusion

This study contributes to extant research by analyzing the causes for mathematics performance 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 OL 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. The study has addressed empirical issues or matters that have been all long not attended by the literature. More especially in all the aspects: OL students, mathematics performance, and Sri Lankan context. 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 OL 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 wide gaps in the performance of students towards mathematics. Especially in developing countries, these gaps are merely seen as consequences of discrepancies in resource allocation among schools. Thus, educational authorities have to pay attention to the provision and development of physical as well as human resources in a fair manner. 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 OL students of Sri Lanka. These results can contribute to the education decision-makers in administration as well as the students to increase their performances; regarding attitudes. Also, the educational authorities can take actions to minimize the mathematics failing percentage of O/L students; regarding school type. 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 92 students as the available sample. The reason for this was the prevailing 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 district in Sri Lanka and especially the Sri Lankan 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 with insufficient 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 education path.

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