



INFLUENCE OF STATE BUS SERVICES ON SCHOOL ATTENDANCE IN UNDER-PRIVILEGED REMOTE AREAS: REFLECTIONS FROM A CASE ANALYSIS IN ESTATE AREAS OF HAPUTALE, SRI LANKA

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ABSTRACT

Free education for all in Sri Lanka has enabled significant improvements in educational performance and living standards. However, there are still some issues unresolved; one being the difficulties in accessing education facilities in the townships, owing to mobility constraints. Students residing in plantation areas, for instance, become inconvenienced when public bus services are absent or unreliable.

The present research quantitatively examined the significance of SLTB bus service availability, inter-alia, in determining the school attendance rate of students residing in remote estate areas. The Haputale Education Division was examined as a case study. Results indicated that, among factors that could significantly affect the level of school attendance of estate children, the availability of SLTB service on estate routes would be very crucial; a significant increase in attendance being realisable if SLTB's scheduled school bus trips operated with greater reliability. The importance of affordable mobility services for school attendance in remote areas, is thus examined.

The study enabled inference that the policy priority should be assigned to further strengthen and expand bus services. This intervention is likely to be more beneficial than focusing on other apparently influential determinants. However, the generalisability of these findings to other estate areas and geographically remote localities of the country needs to be confirmed through further research.

Keywords: *Affordable Mobility, School Attendance Ratio, SLTB bus services, Sri Lanka's Estate sector*

JEL Codes: *I24, L91, L98, N75, R41, R48, R58*

1. INTRODUCTION

The subject of school attendance by children, a global issue, has been researched in the past. Unaffordability of school fees causing early dropouts [1], low levels of family income inducing frequent absenteeism owing to children tending to engage in income-earning activities [2] [3], insufficiency of non-financial incentives to attend schools [4], the inadequacy of attention paid to the issue by families and teachers [5], and locational issues giving rise to problems including transportation [6], [7], [8] have been cited as influencing factors. The latter issue becomes more prominent when the distances from residential localities to schools are high, and when the family income levels become low to afford private modes of mobility.

This constraint of affordable mobility is effective when low-income remote communities in Sri Lanka, including those in the estate areas, are concerned. The estate sector (or plantation sector) in Sri Lanka continues to face many social handicaps in spite of significant socio-economic gains in the aftermath of independence. Though the share of poverty in the sector has decreased in recent decades, it continues to lag behind with its isolated and underprivileged society [9] and low-income households [10]. These low-income people and their families in the estate sector are compelled to travel significant distances to access essential facilities, including public services, located in urban and suburban areas, further aggravating their relative isolation.

Education-related issues are of particular importance in this regard, reflected by early school dropouts, non-attendance, etc., hindering or constraining the accrual of due benefits of free access to public education provided by the State, even though the free education policy has enabled significant gains in terms of literacy and consequent socio-economic gains over the years. The majority of schools in the estate areas are primary schools, and many kids drop out after elementary school. Limited access to secondary schools located in townships is one of the main causes of this problem. Long distances to travel, poor quality of estate roads and inadequate transportation options constrain their mobility [10]. Some pupils have to travel up to 12 kilometres to city schools from the estates where they reside. Most remote estates are located high in the hills where roads are of very poor quality and are unreachable by motorised modes of transport. As a result, many of the children walk a significant distance of their trip to school.

Low income levels in estate areas constrain the affordability of motorised mobility, particularly private modes of transport. This is why affordable bus transportation has long been a source of support for students of low-income families who cannot afford to pay for private transportation, and most estate children, when travelling to schools,

rely heavily on public bus transportation provided at affordable rates on Government subsidies, viewed as investments due to their long-term benefits intended.

Sri Lanka Transport Board (SLTB) provides affordable mobility services to students through its administration of concessionary season tickets, which are of particular use to socially deprived low-income people living in remote areas where private bus operations, particularly at such concessionary fare levels, are absent or insignificant. It is in this context that the estate children's access to education facilities, particularly at secondary and higher school levels, has become inextricably associated with the availability and quality of SLTB bus services.

Anchoring on this key issue of affordable mobility, the present research was undertaken with the objective of examining the significance of influence the availability of public bus transport services provided by the SLTB would be having on school attendance of estate children.

2. LITERATURE REVIEW

In terms of equity and efficiency, the implementation of the free education policy in Sri Lanka in 1945 has become a watershed moment in the country's history. The World Bank [11] opined that free education provided from kindergarten to university, on which the Sri Lankan Government spends 2.1% of its total GDP, is a result of this policy, of which Sri Lankans are proud on education. According to Ranasinghe & Hartog [12], if the government does not subsidise education, only pupils from wealthy households benefit, as suggested by the “elite model” in Backer's Theory, and intergenerational poverty would increase in non-elite cultures.

The Estate sector in Sri Lanka also has significantly benefited from the free-education policy adopted by the Government. Political developments, nationalisation of estates which integrated estate schools into the national education system, and efforts made by plantation trade unions, were among the main reasons behind the expansion of education in the estate sector in the late twentieth century; and the literacy rates in the estate sector of Sri Lanka, according to Little [13], climbed dramatically across the twentieth century.

Though the conditions in estate areas have improved over the years, the estate sector continues to face variety of challenges in terms of education. Poor enrolment at higher grades of schooling, and unsatisfactory school attendance by students are among reflections which possibly indicate that the free education services provided at a very high cost to public coffers by the Government are not fully accrued to the student community. This could be what is reflected through the publication in 2007 by Sahaya Foundation [14] that only 7% of school pupils in estate areas who were enrolled in

GCE (Ordinary Level) progressed to GCE (Advanced Level). Besides, as per data published in 2016 by the Department of Census and Statistics [15], only 3% of students in the estate sector passed the GCE (Advanced Level), while the success rates were 13.2% and 19.4% in the rural and urban sectors, respectively.

The lack of availability of secondary schools offering Advanced Level education in Tamil Medium in estate areas compels candidates who pass the GCE (Ordinary Level) examination to look for schools available in towns [10]. This acts as a disincentive for school enrolment at the GCE (Advanced Level). Those who enrol at city schools would find affordable mobility a crucial requirement, and any inadequacy in that respect would cause increased absenteeism, or even school dropouts. This could induce a negative bearing on the development of students' knowledge, attitudes, and abilities, all of which are considered intended educational outcomes.

Present earnings in the estate sector, according to Ayeshmantha [16], are insufficient even to cover their living expenses. In such low-income conditions, people cannot afford to own a private mode of transportation to meet mobility needs. It is in this context that an adequate supply of affordable transport service becomes crucial vis-à-vis education service access of estate sector students. This is why the Government endeavours to keep public transportation rates affordable for low-income individuals and groups [17]. It is plausible to assume that real spending on bus transportation by impoverished travellers is minimal and not onerous. This hypothesis was supported by Kumarage [18] through an extensive examination of spending by poor and extremely poor households on all modes of transportation and communication, differentiating urban households from those in rural and estate categories; estate residents being found relying more on public transportation than their urban counterparts to access social services.

The importance of public transport services in developing countries has been highlighted by many authors. Rohani et al. [19], for instance, found that public transportation was vital for economic growth and social well-being in developing countries. According to Agarwal & Singh [20], it is public transportation that provides economic mobility to the public. Vasconcellos, dealing with the specific issue of education service access, examined the rural school transport system in facilitating school attendance by overcoming distance-related obstacles with reference to the case of the State of São Paulo, and highlighted the importance of improving transport means of accessing schools in rural areas of developing countries [21]. Moreno-Monroy, et al. emphasised the location-mobility dynamics in alleviating educational inequalities [7], while Kileen and Sipple, in their working

paper submitted to Cornell University, critically analysed the policy of school consolidation in the light of transportation-related issues [8].

In Sri Lanka, like in other developing nations, State-owned public transport entities are maintained and managed to facilitate and provide affordable transportation facilities [22]. Sri Lanka Transport Board (SLTB), being the State-owned public bus operator, is largely operated with welfare motivations, and endeavours to ensure people's mobility at a low cost. Its services had been crucial for mobility and access to education in Sri Lanka, particularly in the non-elite populace, and Gunaruwan & Jayasekera [23] have found that SLTB bus services have made a consistent impact on social welfare metrics, notably in Sri Lanka's education achievements.

Estate residents rely heavily on public bus services provided by the SLTB to go about. Students in particular rely on SLTB bus services offered at significantly discounted fares on monthly season tickets. This is among many public bus transport initiatives Sri Lanka has undertaken since the late 1950s, to ensure affordable mobility in view of enhancing student attendance at schools [18]. However, according to Wijesiriwardane & Amaranath [24], mobility in the estate sectors is constrained. Several locations in the estate sector are reported as suffering from a lack of bus service availability. According to a survey undertaken by Wickramatunga [25], most estate sector pupils (certain divisions in Spring Valley estate, Gampola estate areas, Maskeliya, Norwood estate regions, and so on) have to travel as far as 12 km to access their secondary school. Many youngsters are compelled to walk a significant portion of such distances due to the inaccessibility of affordable motorised mobility means. Thus, it is evident that the non-availability or inadequate reliability of public bus service, reflecting unsatisfactory conditions vis-à-vis all three criteria, namely, efficiency, effectiveness, and equity, adopted to evaluate public transportation service accessibility for school travels [26], has a significant impact on the education of students in the estate sector.

Aside from the public bus transport availability at affordable rates, several other factors, including gender, ethnicity, prior-level educational achievement, family background, financial difficulties, the opportunity cost of schooling, quality of education delivery, stream of education, and distance from residence to school, have been found in literature as influencing school attendance.

Gender, for instance, is referred to as an influential factor because some societies do not grant girls the same rights as boys and thus may deny female students' access to education. Females in the estate sector face educational deprivation [27], and girls record poor attendance than boys in the estate sector schools [28] [29]. As a result, gender difference was considered as a prospective variable to examine for its significance in influencing school attendance.

The estate sector is dominated by Hindus, and to a lesser extent by Muslims, who speak mostly Tamil. When it comes to ethnicity, they are minorities in Sri Lanka. Since Ranasinghe [30] has opined that the majority Sinhalese were more likely to attend schools than the minority groups, “ethnicity” also was considered as a variable to be examined for its explanatory effect.

Quality of education and the opportunity cost of schooling also have been found important factors in determining school attendance [31], [32]. Abayasekara & Arunatilake [33] discovered that school resources impacted the quality of studies and stream choices available in schools. Poor teaching methods and a lack of teacher resources, according to Oghuvbu [34], could affect school attendance. Due to the scarcity of teachers, students would be compelled to enrol in private classes for core subjects such as Mathematics, Science, and Technology. Liyanage [35] having found that inadequate distribution of qualified teachers, as well as a shortage of teachers, for some critical subjects like Mathematics, Science, and Technology, being major issues faced by some areas in Sri Lanka is an indication that teacher availability could also be a potential determinant of student school attendance. His opinion, that there would be a surge of enrolment into the Advanced Level after the Sri Lankan government’s declaration that students without a pass in Mathematics may enrol themselves in the Arts stream, reflects the importance of teacher availability and quality of teaching in determining the education demand by the students. This may be further supported by the findings of Ranasinghe [30] to the effect that the quality of education at school and family background also significantly influence school enrolment decisions and optimal length of schooling.

The degree of success at the GCE (Ordinary Level) examination, which is regarded as the first threshold examination in Sri Lanka, may also have an impact on students’ desire in attending school when they are in their GCE (Advanced Level). A survey conducted by Nanayakkara [36] found that around 22.1% of students were not willing to attend schools owing to financial problems.

According to Reda [37], the distance from residence to school might affect school attendance. Some pupils have to endure long commutes to access education facilities. This is especially true in areas where few schools offer Advanced Level studies. According to the report published in 2020 by the Department of Census and Statistics [38], 30% of schools in Badulla District are 1AB schools, out of which 13 schools were in the Bandarawela Educational Zone. Yet, the Haputale Education division had only two schools in that list.

In summary, the literature strongly suggests that affordable mobility, provided via public bus transportation, could improve and sustain high levels of school attendance ratios. This could be applicable in the Sri Lankan context as well. Many scholars have

conducted studies on student dropouts in Sri Lanka's rural and urban sectors; yet, no studies specific to the estate sector have hitherto been conducted, particularly on the possible influence on school attendance patterns of students in the estate sector in relation to public bus transport, particularly provided at concessionary fares by the SLTB. In that respect, the present research, conducted with the aim of investigating the relative influence public bus transportation service provided by SLTB, inter-alia, could be having in determining the school attendance of estate sector children, ventures into a hitherto unexplored area.

3. METHODOLOGY

The present research delved into the key issue of the availability of public bus transport services provided by the SLTB and its influence on school attendance of estate children, through a detailed examination of the case of Haputale Educational Division in Badulla District of Sri Lanka.

Haputale Tamil Central College, the only school in the Haputale area which offers education facilities in Tamil Medium up to GCE (Advanced Level) in Arts, Commerce and Technology Streams in Tamil medium¹, was selected to conduct this research. The students were found travelling from distant residential estate areas to Haputale town to attend this school. The entire student population in G.C.E (Advanced Level) in the selected school, amounting to 298 students, was included in the analysis.

The study procedure involved several stages. First, the relevant variables, together with SLTB bus transport service availability, which could potentially determine school attendance, were pre-selected based on findings through the literature survey. Second, the relevant data were sourced, both from primary and secondary sources. Third, the significance of such prospective variables in determining school attendance was examined through correlation and regression analyses. Fourth, the best fitting regression model was developed while step-wise inclusion and exclusion of explanatory variables, which was thereafter used for the purpose of analysis. Finally, the results were interpreted to arrive at conclusions and for making recommendations.

It was also expected that the findings of this study would possibly be relevant to other geographically isolated areas in Sri Lanka with similar conjunctures.

¹ There is no school in Haputale Educational Division which offers GCE (A/L) education facilities in the Science Stream in Tamil medium, and the students opting to study Science subjects have to travel to Bandarawela.

3.1. Selection of Variables

The focus of this study is the degree of influence the affordable mobility via public bus transport could potentially be having on the school attendance of children residing in estate areas. Therefore, the School Attendance Ratio (AR) pertaining to each and every GCE (Advanced Level) student in the selected school, and the SLTB Bus Service Availability Ratio (BR) became the two main variables subject to analysis. The Attendance Ratio (AR) of each student was defined as the number of days of presence at school as a percentage of the total number of school days on a monthly basis. The SLTB Bus Service Availability Ratio (BR) was defined not only to represent the operated kilometres as a share of scheduled kilometres of a scheduled SLTB bus route corresponding to each month, but also to include, with a value “0”, the cases where the particular student’s residential estate had no scheduled public bus service.²

Several other prospective determinant variables were also selected based on the findings of the literature survey, including Family Income level (FI), Private Vehicle Ownership (PV), Gender (G), Stream of Education (S), Ethnicity (E), Distance from home to school (D), and the perceived Quality of Teaching (QT). Those were defined as follows:

- Family Income level (FI): Level of monthly income of the family (in Rupees)
- Private Vehicle Ownership (PV): 1 if available, and 0 otherwise
- Gender (G): 0 if Male, and 1 if Female
- Stream of Education (S): 1 if Arts or Commerce, and 0 if Technology
- Ethnicity (E): 1 if Indian Tamil, and 0 otherwise
- Distance from home to school (D): Distance from school to residence (in km)
- Perceived Quality of Teaching (QT): 1 if influencing attendance, and 0 otherwise

The lagged variable of the Attendance Ratio of the prior year (ART-1) was also considered in the regression analysis to examine whether any continuity of attendance pattern could be observed.

3.2. Data collection

A questionnaire survey was conducted among all 298 students in GCE (Advanced Level) at Haputale Tamil Central College to obtain primary data on the prospective

² The value “0” of the variable BR, therefore, would represent both unavailability of a scheduled bus operation, and non-operation of an available scheduled bus service.

variables, other than the school Attendance Ratio (AR) and the SLTB's Bus Service Availability Ratio (BR), for which secondary data sources were perused.

At the very outset, the survey indicated that the estate areas where the students subject to the survey were residing had no recognisable private bus operations, particularly those offering services at concessionary fare levels similar to those provided by the SLTB. Most survey respondents mentioned that they had to walk to the nearest available alternative route, or all the way to the school at Haputale, if and when the SLTB buses in their residential routes were not operated. These residential estates included far-away localities such as Meeriyabedda, Maousakele, Nahaketiya, Galkanda, Haputale Estate, Kelburne, Devagala, Bandara Eliya, Mahakanda, Poonagala Lower Division, Makuldeniya, Muthuwana, Gonamotawa Upper Division, Nayabedde Upper-Division, Udawela, Memale, Balagala and Pudhukkadu, from where the students were travelling to the selected school at the Haputale town, are indicated in the location map depicted in Figure 1.



Figure 1: Estate Areas from where Students were travelling to Haputale

Source: Authors' creation, based on <https://mapcarta.com/Haputale/Map>

Thus, it became clear that the students subject to the present study were highly dependent on affordable bus services provided by the SLTB for their mobility. The study therefore focused on the SLTB bus services operated in the relevant routes to examine their possible influence on school attendance by the estate children in the Haputale Education Division. The databases of the SLTB, focusing specifically on the O-51 report pertaining to the Bandarawela Depot, were accessed to gather data on bus operations in the corresponding estate routes.

The attendance records maintained at the school were perused to work out the monthly School Attendance Ratio (AR) for each student, covering 10-month period from July 2019 onwards, which were used in both correlation and regression analyses.

3.3. Study procedure and model building

Being estate sector students with no other alternative affordable means of mobility available to them, their attendance at school would be significantly affected if the SLTB bus service was unavailable on any given day. This was the main hypothesis advanced in this research. Thus, the variable of SLTB's Bus Service Availability Ratio (BR) in the relevant routes was statistically tested, together with other possible determinants, for its significant influence on the school attendance ratio at the H / Tamil Central College in the Haputale Educational Division.

The quantitative examination was conducted in three stages; namely, (a) the analysis of descriptive statistics, (b) the correlation analysis, and (c) the regression analysis. In such examinations, the null hypotheses of the School Attendance Ratio (AR) not being significantly influenced by the prospective determinants, namely, the SLTB Bus Service Availability Ratio (BR), Family Income level (FI), Private Vehicle Ownership (PV), Gender (G), Stream of Education (S), Ethnicity (E), Distance from home to school (D), lagged variable of Attendance Ratio of the prior year (AR_{t-1}) and the perceived Quality of Teaching (QT), were tested against their corresponding alternative hypotheses that such variables bearing significant influence in determining the School Attendance Ratio (AR).

With respect to the regression analysis, a cross-sectional regression was considered more appropriate to investigate the variables that influenced school attendance, as the patterns of evolution over time were not considered an objective of this study. The following regression model was evolved as the best fit after several steps of including and excluding determinant variables, also learning from the outcomes of the correlation examinations:

$$AR = \beta_0 + \beta_1(BR) + \beta_2(FI) + \beta_3(PV) + \beta_4(G) + \beta_5(S) + \beta_6(E) + \beta_7(D) + \beta_8(AR_{t-1}) + \beta_9(QT) + \varepsilon \quad \text{-----} \quad (1)$$

4. ANALYSIS, RESULTS AND DISCUSSION

The survey outcomes revealed that an average student would travel 19.5 km to school from the residence in an estate. Their average Attendance Ratio (AR) during the study period was 0.71 (or 71%) with a standard deviation of 0.25. The corresponding Bus Service Availability Ratio (BR) had an average of 0.14 (or, 14%) and a standard deviation of 0.25, with 171 students out of the totality of 298 (or 57%) studying for

the GCE (Advanced Level) at Haputale Tamil Central College, had either no scheduled bus service into their respective residential estates, or any scheduled services were not operational. Figure 2 depicts a group-wise representation of the school attendance ratio of the students as against the corresponding bus service availability in the relevant routes, as revealed through the operation statistics sourced from the Bandarawela Depot of the SLTB.

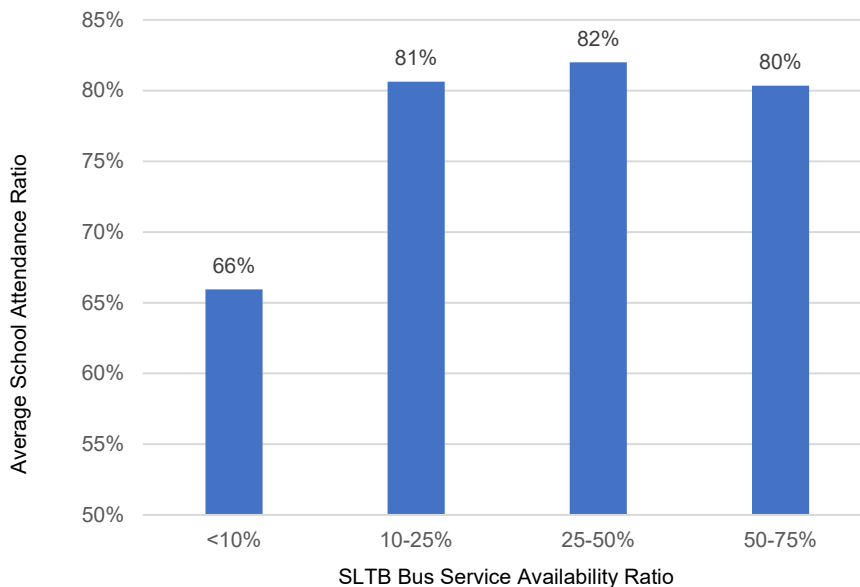


Figure 2: Relationship between the Average School Attendance Ratio and the SLTB Bus service Availability Ratio in relevant routes

Source: School attendance record books and O51 Report of Bandarawela Depot

The above comparison of data indicates that the SLTB's bus service provision could possibly have an influence over the school attendance levels of estate children in Haputale, even though 48% of the families, as revealed through the survey, had their own private vehicles.

Table 1 summarises the results of the correlation analysis. Accordingly, the SLTB Bus Operations Ratio (BR) was found correlated with School Attendance ratio (AR) at a 1% level of significance. The null hypothesis of the variable Private Vehicle Ownership (PV) "not having a relationship with school attendance ratio" could not be rejected even at a 10% significance level, indicating possible heavy dependence of estate children on public transport for schooling.

Table 1: Results of the Correlation Analysis

Null Hypotheses (H₀) Examined:		
Primary Null Hypothesis: <i>There is no relationship between the Bus Operations Ratio (BR) and the School Attendance Ratio (AR)</i>		
Secondary Null Hypotheses: <i>There is no relationship between each of the examined prospective variables (below) and the School Attendance Ratio (AR)</i>		
	Pearson Correlation	Significance (2-tailed)
<i>BR (SLTB Bus Service Availability Ratio)</i>	0.314***	0.000
<i>FI (Family Income)</i>	0.285***	0.000
<i>PV (Private Vehicle Ownership)</i>	0.006	0.775
<i>G (Gender)</i>	0.252***	0.000
<i>S (Stream of Education)</i>	0.285***	0.000
<i>E (Ethnicity)</i>	0.071***	0.000
<i>D (Distance from residence to school in km)</i>	-0.312***	0.000
<i>QT (Perceived Quality of Teaching)</i>	0.037*	0.052
<i>AR_{t-1} (Lagged Attendance Ratio)</i>	0.624***	0.000

*** Significant correlation at 0.01 level; ** Significant correlation at 0.05 level, *Significant correlation at 0.1 level, all two-tailed.

It is noteworthy that the above correlation results indicate the presence of a strong relationship (at a 1% level of significance) between each of the tested prospective influential variables, excluding the Private vehicle Ownership (PV) and perceived Quality of Teaching (QT), and the School Attendance Ratio (AR).

All those significantly correlated candidate variables were retained in the regression analysis in the first place. The variable Perceived Quality of Teaching (QT), the null hypothesis of which being not related to the Attendance Ratio (AR), would be rejected at a 10% level of significance, thus indicating a weak relationship, was also included. The variable Private Vehicle Ownership (PV), the only other mobility means subject to analysis in this research, was also tested for possible inclusion in the step-wise development of the regression model.

The model thereby constructed was tested for the validity of assumptions; the possibility of multicollinearity issue was excluded by estimating Variance Inflation Factor (VIF) values [39], which were found significantly below 10 (Appendix A), the problem of heteroscedasticity was addressed and partly corrected by adopting the cluster robust method, and the normality was examined and confirmed (Appendix B).

Table 2: Multiple Regression Results

$AR = 0.228 + 0.109(BR) + 0.014(FI) + 0.001(PV) + 0.044(G) + 0.049(S) + 0.002(E) - 0.066(D) + 0.574(AR - t) + 0.016(QT)$			
<i>N</i> = 2980	<i>Prob</i> > <i>F</i> = 0.000	<i>Adjusted R2</i> = 0.42	
Determinant	Coefficient	p -Value	t - Value
BR	0.109 ***	0.000	3.76
FI	0.014 ***	0.000	3.50
PV	0.001	0.077	0.13
G	0.044 ***	0.000	5.50
S	0.049 ***	0.000	5.44
E	0.002	0.064	0.20
D	-0.066 ***	0.000	-2.75
AR-t	0.574 ***	0.000	26.09
QT	0.016	0.055	1.78
Constant	0.228	0.020	11.50

*** Significant at 0.01 level; ** Significant at 0.05 level.

The results of the regression analysis, summarised in Table 2, confirm that the Bus service availability ratio (BR) is a significant determinant of School attendance ratio (AR) at a 1% level of significance ($t > 2.0$, $P < 0.01$). Family Income (FI), Gender (G), Distance (D) and Prior-year Attendance (AR_{t-1}) also emerged as significant determinants. It is noteworthy that the “perceived” Quality of Teaching (QT) and Private Vehicle Ownership (PV) did not emerge significant ($t < 2.0$, and $P > 0.05$), converging with the results of the correlation analysis. Yet, “Ethnicity” (E), which showed significance in the correlation results, did not emerge as a significant determinant in the regression analysis. An attempt was made to re-estimate the model; excluding those variables which emerged insignificant did not give rise to any alteration to the significance of variables retained, nor did it result in any improvement to the model acceptability parameters. Therefore, the model estimated, including those insignificant variables, was retained for making further analyses and inferences.

Among important observations, “family income” emerging as a significant determinant of school attendance ratio ($p < 0.05$ and $t = 3.50$), a convergent result from both correlation and regression analyses, was an important revelation. In the estate sector, as revealed through literature [40], [41], the socioeconomic standing is comparatively weaker. Although the poverty headcount has decreased in the estate sector, the estate community has not turned the corner, and poverty in its different

expressions is still a reality [42]. The children in this community tend to drop out from schools and to enter the job market earlier because of direct costs (such as purchasing education material, books, etc., and transport expenses), as well as the opportunity cost (possibility of earning an income if engaged in a job) associated with schooling [3]. Low family incomes may be compelling boys to go seeking jobs, possibly causing their poorer attendance ratios compared to girls; both correlation and regression analyses revealed that “gender” (being female) was positive and significant as a determinant of school attendance ratio, while the responses given by boys to the questionnaire survey also confirmed this tendency.

The distance between home and school emerging significant ($p < 0.05$ and $t = -2.75$), and its coefficient being negative (-0.066), indicate that residences at a closer proximity to school would enable better attendance ratios; a finding in conformity with previous research [7], [8], [21] [43]. Though the “perceived quality of teaching” was not found significant, the “study stream” appeared significantly influencing school attendance ($p < 0.05$ and $t = 5.44$). Students in the Arts and Commerce streams showing higher attendance ratios than those in the Technology streams could possibly reflect the unavailability of qualified teachers in the Technology stream, thus discouraging student attendance.

Another noteworthy observation was the significant explanatory power (with $p < 0.05$ and $t = 26.09$) of the variable representing “prior-period attendance level” on current-period attendance; a possible reflection of a persistence of “behavioural patterns”. While further research would be needed to identify the factors behind this observation, education-related psychological attributes, social issues, family problems, and parental conduct, etc., could possibly be such causes.

The SLTB Bus Service Availability Ratio, the focal aspect of this research, was found highly significant at a 1% level in both the correlation analysis and regression results ($P < 0.05$ and $t = 3.76$), indicating the importance of affordable mobility services provided by the SLTB to children in estate areas in accessing schools located in the township. The model developed in this regard depicts that every 1% increase in SLTB’s service availability ratio, *ceteris-paribus*, would lead to nearly 0.11% of its impact favourably felt on the school attendance ratio.

The study also examined, using the regression model, the potential beneficial impact the SLTB Bus Service Availability Ratio (BR) would possibly have on the School Attendance Ratio (AR) under different scenarios of bus service availability levels in the relevant estate areas; the results are depicted in Table 3.

Table 3: Possible improvement of the Average Attendance Ratio based on the SLTB Service Availability Ratio

Model used:						
$AR = 0.228 + 0.109(BR) + 0.014(FI) + 0.001(PV) + 0.044(G) + 0.049(S) + 0.002(E) - 0.066(D) + 0.574(AR - t) + 0.016(QT)$						
Assumption:						
<i>Values of the other determinant variables remain unchanged</i>						
	Present Level		Scenario of Improvement			
SLTB Bus Service Availability	14%	20%	40%	60%	80%	100%
Achievable school attendance level	71.0%	71.7%	73.8%	76.0%	78.2%	80.0%

Source: Authors's estimates

Several inferences stem from these results. First, it could be observed that the average SLTB bus service availability for the GCE (Advanced Level) student population in the estate areas of Haputale Education Division was merely 14%, which cannot be considered a satisfactory level of bus service provision.³ This weakness seemed further accentuated by the fact that these estate areas, according to the survey results, did not appear to be benefitted from any alternative affordable public transport mobility means, making the students residing in these estates heavily dependent on SLTB bus services, operated at concessionary fares, for their schooling. Second, the results indicate that the average school attendance ratio could be increased if a reliable SLTB bus service is made available to all students residing in the estate areas; a 100% service availability ratio, ceteris-paribus, would enable the average school attendance ratio to augment from the present level of 0.71 (or, 71 percent) to 0.80 (or, 80 percent), a significant achievement realisable on account of ensuring affordable mobility alone. Thirdly, the results indicated also that such a gain on account of bus service availability alone would be accrued overwhelmingly to the students from low-income families and those residing deep in the estates with long distances away from their schools, who would be unlikely to be able to find alternative private mobility means to get to schools in the absence of bus services owing to economic reasons. Therefore,

³ The "Service Availability Ratio" was defined in this study as a composite average of both the bus operation ratio (actually operated trips as a ratio of scheduled trips) on those routes where SLTB bus services had been scheduled, and the complete unavailability of bus services in many other routes with no scheduled bus operations (in regard to such cases, the availability ratio is obviously zero).

the welfare benefits of such an expanded and improved bus service availability, could potentially be quite substantial and targeted.

The findings of the questionnaire survey administered among students also supported this inference. Only around 11% of students surveyed reported that they travelled to school by motorcycles, while the others had to either walk to school (if they resided at a practically walkable distance from school) or rely on bus services to travel to school. Many respondents stated that they would not be able to afford alternative travel modes, and thus, the low-cost season tickets offered by SLTB appeared to be facilitating a large majority of students travelling to school; an inference quite congruent with those of previous research [1] [7] [5].

The survey also revealed many other inconveniences experienced by the students, when faced with public transport-related problems in travelling to school, which are graphically depicted in the Figure 3.

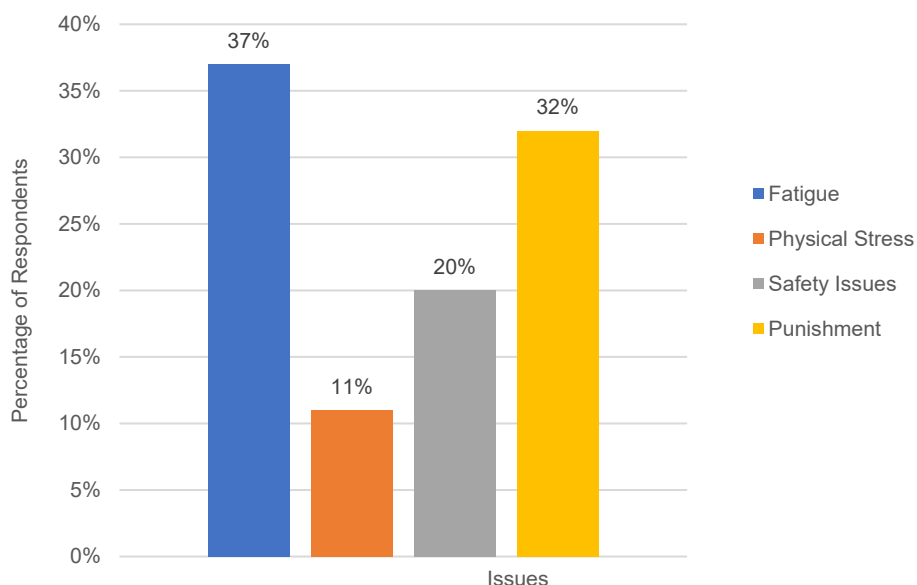


Figure 3: Issues faced by students due to problems associated with transport

Source: Author Compiled

Accordingly, 37% of the respondent students reported that they experienced fatigue when having walked long distances to and from school whenever the bus service in their respective route was not operated. Survey results indicated that the students facing such unavailability of bus service had to walk over 5 kilometres, in average, to get to fetch a bus on an alternative route, or to walk all the way to school. Walking over longer distances also would cause safety concerns (as reported by 20% of

respondents) inducing parents to prevent their adult daughters from walking to distant bus stops in alternative routes or all the way to school, whenever the bus service in their residential area was not operational. Besides, according to findings from the survey, regular bus passengers on a route would resist students coming from other areas because such newcomers would overload buses in their routes, and thus tend to face verbal and even physical harassment. In addition, the students, as revealed from 32% of survey respondents, when late to school owing to irregularities, delays or non-operation of bus service in their route, tend to get punished by their teachers. These eventualities cause mental stress, as reported by 11% of the respondents, whenever and wherever bus services were either unavailable or unreliable, in addition to other academic-related consequences of being late to school or being absent.

These findings provide ample evidence that inadequate access to affordable motorised mobility could be the primary cause for poor school attendance of estate sector students. Therefore, it could be suggested that even the present level of overall average school attendance ratio of 71% of GCE (Advance Level) students, revealed through the school records at H / Tamil Central College, would have been significantly facilitated by the SLTB bus operations.

The impact the SLTB bus service availability makes on the accessibility of education facilities by estate sector students through the provision of affordable mobility is thus evident. In that respect, it could be inferred that the estate sector students belonging to low-income families would face harsher consequences in securing affordable mobility to attend schooling, and thereby suffer in benefiting from free education services leading to longer-term welfare repercussions, if the SLTB service availability ratio is allowed to further deteriorate. On the other hand, the possibility of significantly improving the school attendance of the students residing in geographically remote areas by further strengthening and expanding the SLTB bus services, and in case if such is not feasible, by introducing affordable private bus service models such as *Sisu Seriya* programme [44], is clearly evinced through the outcomes of the present research, warranting the attention of policymakers.

5. CONCLUSIONS

The outcomes of the study pertaining to attendance of students at Haputale Tamil Central College, undertaken as a case study, through regression and correlation analyses using secondary data, yielded strong evidence to suggest that the SLTB's Bus Service Availability Ratio could bear a significant impact on school attendance of students residing in remote estates in Haputale area. This outcome was further substantiated by convergent results obtained through the questionnaire survey; the attendance ratio was observed quite unsatisfactory when and where the SLTB bus

services were not available, but the ratio was discovered to be much higher when the SLTB bus service availability was dependable with high operations ratios. In between, the student attendance ratio was found a little higher though still insufficient when the SLTB services were available, but unreliable with low operations ratios. The study also revealed that problems associated with public transportation consistently caused students to suffer from a variety of disadvantages, including inter-alia, physical stress, fatigue, safety concerns, and even penalisation at school whenever they were late.

The regression and correlation results also established that family income, gender, study stream, prior-year attendance level, and the distance from home to school also would be significant determinants influencing school attendance, while private vehicle ownership and quality of teaching would have no significant impact on school attendance ratio of estate children.

It is noteworthy, however, that the insignificance of ‘ethnicity’ as a determinant observed in the regression results is contrary to the outcome of the correlation analysis, where a significant and positive correlation between attendance ratio and ethnicity was observed. The reason behind this outcome could be that the relative significance of variables would differ when the entire gamut of variables was taken into analysis together in the regression model.

It is pertinent to observe that the main inference; viz, the strong determining effect the SLTB’s bus service availability would be having on school attendance ratios of students, converges with past literature where SLTB’s bus services had been found instrumental in achieving high Physical Quality of Life Indices in the post-independence Sri Lanka. This is an important inference, particularly for its policy relevance, because, unlike many other factors that influence school attendance, the availability of SLTB bus services is a strategically manipulatable variable.

Therefore, the findings of this paper could be used by the policymakers, especially in ensuring the reliability of existing scheduled bus services in remote estate areas, and also to further expand their coverage to facilitate affordable mobility to school-going children, enabling their improved attendance at schools. In this respect, it could be recommended that action be taken to investigate the constraints hindering the provision of reliable SLTB bus services to and from such geographically remote localities, including estate areas with similar conjunctures and provide appropriate solutions. Development of estate road infrastructure, regularising and continuous monitoring of existing school bus services, and appropriately expanding such services through “*Sisu Seriya*” scheme could also be explored as possible strategic interventions in this regard.

It may, however, be important to understand the necessity to confirm the generalisability of the outcomes of this study through further research, even though the parameters prevailing in remote rural and estate areas in general are likely to be common and similar to those pertaining to the Haputale estate area examined under the present research. Therefore, while the outcomes of this research could be hypothesised as extrapolatable into all remote areas in Sri Lanka with similar conjunctures, thus shedding light on the importance of affordable mobility provided through public transport services in enabling rural and estate children to access education facilities in townships, it is recommended that location-specific studies also be undertaken, taking into consideration different geographic, regional, and social characteristics, prior to formulating strategic interventions for each such locality.

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APPENDICES

Appendix A:

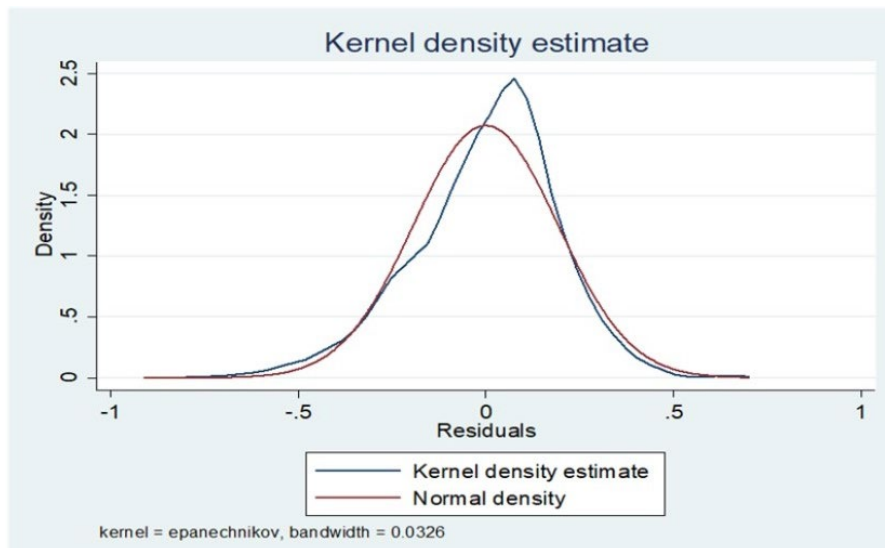
Variance Inflation Factors (VIF) in testing for Multicollinearity

Variable	VIF	1/VIF
ST	1.3	0.77
G	1.19	0.84
AR-t	1.19	0.84
FI	1.12	0.89
BR	1.08	0.92
QT	1.08	0.93
E	1.05	0.95
D	1.04	0.96
PV	1.04	0.96
MEAN VIF	1.12	

Source: Author Compiled

Appendix B:

Normal Distribution Test Results of the Model



Source: Author Compiled