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Research Article

Performance on Achievement Tests in Three Learning Areas among Preschool Children in Sidama Region, Ethiopia

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ABSTRACT

The objective of this study is to examine how preschool children in the Sidama region perform on achievement tests in three learning areas (environmental science, early mathematics, and first language. This study is part of a larger doctoral dissertation that initially employed a convergent parallel triangulation mixed-methods design (QUAN–QUAL). However, this study mainly focuses on the quantitative component of the mixed-methods research. The sample of children was equally representative based on school setting or location (urban-rural) and sex (boys-girls). Tests were administered to 184 children randomly selected from 10 public preschools. Data were analyzed using descriptive and inferential statistics, including multivariate analysis of variance (two-way MANOVA). The findings showed that children perform relatively better in environmental science and mathematics than in their first language. Boys perform better in early mathematics, whereas girls perform better in basic language. Although urban schools have better facilities and infrastructure, rural children perform better across all three learning areas. Moreover, sex and school location separately affect children's performance, but only together affect early mathematics score, $F(1, 184) = 4.31$, $p < .001$, partial $\eta^2 = .023$. The findings point to the need for further research on the first language policy of the region with a larger sample size. More specifically, further research is needed to investigate seriously the pros and cons of teaching preschool children in Amharic and Sidamu Afoo.

1. Introduction

It is believed that children's future success in school is significantly influenced by early education. According to Akinbote et al. (2010), early years' education can be beneficial and risky for a child's future; it may either make or spoil a child permanently. To emphasize this point, Aristotle is often quoted as saying, "Give me a child until he is seven, and I will show you the man" (Thomas & Cooke, 2013). In addition, one rationale for early childhood programmes is that they bridge the gap between home and school, leading to better adjustment to primary school and higher achievement (UNICEF, 2019). Thus, preschool education can determine the entire future of children. It is obvious that early education primarily works on children's readiness and transition to early primary school (UNESCO, 2021). Preschool education programs can minimize learning poverty in early primary school.

In addition, the preschool program can equip children with basic skills (reading, writing, numeracy, communication, and emotional intelligence) to prepare them for primary school and ensure a smooth transition (Tirussew et al., 2017; USAID, 2023). It also aids in introducing alphabetical and mathematical concepts and encourages them to explore their surrounding world and environment (UNESCO, 2021). The African Union's Department of Early

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Childhood Development emphasizes preschool's significance for three reasons: (1) it builds a strong learning foundation, (2) it improves educational efficiency by lowering grade repetition and dropout rates, and (3) it fosters equity and economic growth by supporting disadvantaged children (African Union n.d). Ultimately, the preschool program aims to ensure children are ready for primary school. However, the question remains: how many children in developing countries, especially in remote and rural areas, have access to the opportunities needed to achieve school readiness and a smooth transition from home to preschool and from preschool to early primary school?

At the national level, the preschool program in Ethiopia has received relatively more attention since 2018 than ever, and it has become a priority agenda of the FDRE government, as supported by some of the evidence presented herewith. For example, first, for at least a few years, O classes have been established in all regions. This was one of the indicators of that progress (MoE, 2022). Second, different policies, programmes, and directives emphasize access, equity, and quality in ECD. For example, ESDP VI emphasizes "bringing schools closer to communities and ensuring that all children can access pre-primary education as a preparation for schooling" (MoE, et al., 2010). Third, since 2018, various policy documents have been issued to implement ECD programmes nationwide. For example, in 2018, the ECD framework was designed to be implemented by three ministries of the country in collaboration [i.e., the Ministry of Education (MoE), Ministry of Health (MoH), and Ministry of Women and Social Affairs] (MoE, 2022). These elements can influence children's academic performance in their early years.

Recently, the Ethiopian government revised the existing education and training policy and restructured the national education system as part of reforms (MoE, 2023). For example, pre-primary education covers levels I and II for ages 5-6, primary school covers grades 1-6 for ages 7-12, middle school includes grades 7-8 for ages 13-14, and secondary school encompasses grades 9-12 for ages 15-18. Additionally, children aged four are provided preschool education through alternative bases (Alemu, Kidane, & Zeleke, 2026; MoE, 2023). Thus, preschool education is generally designed for children aged 4 to 6 to prepare them for primary school. Officially, children enter grade one at age seven.

When we look at statistical evidence, only half of the world's preschool-age children are enrolled in pre-primary education (UNESCO, 2021). Despite the benefits of ECE, over 50% of children worldwide—about 175 million—lack access (UNESCO, 2021). In developing nations, about 219 million children aged below 5 years didn't get access to ECD (Young & Richardson, 2007). In Africa, 75% of children do not participate in early education (Tefera & Hagos, 2016). Likewise, ECE enrolment in sub-Saharan Africa covers 32% of the age group, corresponding to 24 million students (UNESCO, 2021). According to UNICEF (2019) projections, if the current trends continue, by 2030, out of 1.4 billion school-age children in low- and middle-income countries, 420 million will lack the most fundamental skills of early childhood, and 825 million will not attain basic secondary-level skills (UNICEF, 2019).

In Ethiopia, for the 2023/24 academic year, approximately 8 million children were enrolled in preschool programs (MoE, 2023), with 50% remaining out of preschool. As UNICEF (2019) states, over half (+8million) Ethiopian children are excluded from ECE. In advanced Western countries, early education is required for entry into grade one (Alemu, Kidane, & Zeleke, 2026; Young & Richardson, 2007). The new Education and Training Policy (MoE, 2023) mandates the government to provide free and compulsory early childhood education (ECE) for children aged five and six, with optional education for four-year-olds (Sintayehu, 2020; MoE, 2023). But we are not still there to make ECE compulsory.

Therefore, empirical evidence at global, national, and local levels affirms critical gaps in early learning interventions for children's school readiness. The key causes for these gaps may vary from place to place. One of the causes is that less attention is given to preschool education than to middle or higher education. The existing practices on the ground are quite different from what is expected. Consequently, children's readiness for primary school is not significant, and the transition culture of parents or schools from home to preschool and from preschool to primary school is not well experienced. Getting children ready for school cannot happen in a vacuum, and all stakeholders must work together. The main gaps identified in this study are as follows: in three core learning areas, the extent to which children know what they ought to know at this level has not yet been addressed well in this region. Most of the time, the competencies of preschool children are judged by their teacher; therefore, this test seeks to assess children's actual performance in three core learning areas.

This study planned to fill these gaps by exploring the following research question: (1) *what is the actual performance on three achievement tests among public pre-schoolers in the Sidama region, Ethiopia*? Under this main research question, there are sub-questions. These include (a) *in which area among the three learning areas (environmental science, early mathematics, and first language) are children performing well, and in which area are*

they struggling? (b) *Among preschool level II children who perform well, in which areas are they struggling in terms of school setting (location –urban or rural), and sex (boys or girls)*? (c) *is there a combined effect of school setting or location and sex on the performance of children in three learning areas?*

This study holds potential significance in several areas. Firstly, its findings can contribute to education policy specific to the language of instruction currently used in both urban and rural areas of the Sidama region. Results of the study may help determine which of the three learning areas children excel in, and which they struggle with. So this helps to take immediate remedial action for the improvement of preschool programs. Finally, the study's findings can contribute to the existing literature. It can also enhance the current body of knowledge by suggesting necessary policy reforms at the national level. Overall, this study has the potential to make contributions to preschool education policy, and to the existing literature in the field.

2. Methods and Materials

2.1. Research design

This study is part of a larger doctoral dissertation that initially employed a convergent parallel triangulation mixed-methods design (Creswell, 2013). However, this study mainly focuses on the quantitative component of the mixed-methods research. Specifically, it examined the achievement test scores of public preschool children in three learning areas: environmental science, early mathematics, and first language. Only a limited number of interview results were included to help explain and support the quantitative findings for clarity.

2.2. The setting

This study was conducted in the Sidama regional state, the capital of which is 274 km away from Addis Ababa. The region was officially established as an independent regional state on 18 June 2020, following a referendum vote that separated it from the former Southern Nations and Nationalities Regional State of Ethiopia. The Sidama regional state consists of four zones, namely Bensa (Eastern zone), Aleta Wondo (Southern zone), Yirgalem (Central zone), and Hawassa (Northern zone), and one city administration (Hawassa City Administration).

According to the Sidama Region Education Bureau report, preschool education has been offered in primary schools for the last few years. The region has 1,051 primary schools, most of which host preschool programs. Approximately 1,041 schools provide full pre-education services. As a result, some schools operate their preschool programs independently, while others collaborate with primary schools. Accordingly, the gross enrolment rate (GER) of preschool children in the region in 2025/26 was 107,732 boys and 101, 466 girls, with a total of 209,198. This study included only preschools that are independently run, with 26 preschools in total.

In the Sidama region, the residents are of mixed ethnicity. They speak different languages, predominantly Sidamu Afoo and Amharic, in both rural and urban. Children who are born in rural areas speak Sidamu Afoo, whereas children who are born in urban areas speak Amharic. The national and regional policy of education stipulates that children should learn in their first and the working language of the state, which is Sidamu Afoo (MoE, 2023; SRC, 2024).

However, the regional education bureau, in collaboration with preschools and parents, has discussed seeking alternatives for urban preschools who speaks Amharic language. Accordingly, they reached a consensus on the language of instruction for their children's preschool, either Amharic or Sidamu Afoo. Thus, most parents in Hawassa City Administration and other zone cities, such as Yirgalem, Laku, Wondogenet, and Aleta Wondo, prefer Amharic as the language of instruction for their children. Though the preschool curriculum in the region was originally designed in Sidamu Afoo, irrespective of language of children spoken, it was translated into the Amharic language for urban schools.

The objective of this study is to examine how preschool children in the Sidama region perform on achievement tests in three learning areas (environmental science, early mathematics, and first language. The curricula of preschool clearly indicates that the selected seven core competency areas are to teach preschool children in two-year programs at level I (KG1) and level II (KG2). These include: first language, environmental science, personal and socio-emotional development, performing and visual arts, mathematics, and health and physical education. Among these seven learning areas, three areas were purposely selected, namely first language and environmental science, since these are core learning areas compared to others.

2.3. Participants of the study

Preschools were classified depending on their location (urban or rural) to ensure that equal proportion of urban-rural preschool children are represented. Then, a systematic random sampling technique was used to select the children. Then, all preschools that had children in level II were listed under their four zones and city administration. Then two preschools from each zone and the city were randomly selected. Table 1 illustrates the number of early childhood schools sampled from each zone.

Table 1. Number of preschools selected from each zone

SN	Zones	Population Preschools(N)	Sample Preschools(n)
1	Central Zone	3	2
2	Eastern Zone	4	2
3	Northern Zone	3	2
4	Southern Zone	3	2
5	Hawassa (City Administration)	5	2
	Total	18	10

Source: Own survey data, 2025

After selecting each preschool, one intact class from each sampled preschool was chosen using a lottery method. The minimum class size of intact class is 59. From each sample intact class, researchers took 1/3 children from minimum class size which was 19.4 children. To select children from each intact class, names of all children in each were listed out in two categories boys and girls. Based on the lottery method, the researchers selected an equal number of boys and girls. The balance portion of urban-rural combination was also kept. We administered achievement tests to 19 children from four preschools and 18 children from six schools, with matching proportions of school location and gender, with a total of ten preschools. Thus, 194 children (97 from rural and 97 from urban preschools) participated in the study.

2.4. Measures

For this study, two sections of a questionnaire were administered. The initial section focused on capturing pertinent demographic information about the children (i.e., sex, location of preschool, and language of instruction). The second section of the questionnaire comprised the scales for the core variables in three main areas: *Environmental Science Scale* (ESS), *Early Mathematics Scale* (EMS), and *First Language Scale* (FLS).\

The second tool was the Children's Achievement Tests (CAT), adapted from Brenneman (2011) and EGRA (USAID, 2010), which measured the extent to which preschool programs prepared and equipped children for Grade 1 readiness in three core learning areas, namely Environmental Science Scale (ESS), Early Mathematics Scale (EMS), and First Language Scale (FLS) which were filled in by the researcher and his assistants.

Environmental Science Scale (ESS): The tool was adapted from Brenneman (2011) and EGRA (USAID, 2010), which measured the extent to which preschool programs prepared and equipped children for Grade 1 readiness in Environmental Science Scale (ESS) learning area. This study employed this scale with minor modifications to reduce the items' level of difficulty, considering the preschool curriculum. The scale consisted of nine items that were designed to measure children's level of understanding in basic environmental science skills. The researchers and their research team rated children's environmental science knowledge based on their responses on a 2-point scale ranging from (1) correct to (0) incorrect.

Early Mathematics Scale (EMS): The tool was adapted from USAID of the Early Grade Reading Assessment (EGRA) (USAID, 2010). This study employed this scale with minor modifications to reduce the items' level of difficulty, considering the preschool curriculum. The scale consisted of eight items that were designed to measure children's level of understanding in early mathematics competency. The researchers and their research team rated children's early mathematics competency based on their responses on a 2-point scale ranging from (1) correct to (0) incorrect.

First Language Scale (FLS): The tool was adapted from USAID of the Early Grade Reading Assessment (EGRA) (USAID, 2010). In the present study, the scale was used with minor modifications that focused on reducing the items' level of difficulty, considering the preschool curriculum. The scale consisted of nine items that were designed to measure children's level of understanding in basic reading and writing skills. The researchers and their research team rated children's first language skills based on their responses on a 2-point scale ranging from (1) correct to (0) incorrect. Though the language of instruction is Amharic in urban preschools and Sidamu Afoo in rural preschools, the contents of the tests remain the same in both contexts.

2.5. Improvements on the instrument before the commencement of data collection

The Children's Achievement Tests (CAT), adapted from Brenneman (2011) and EGRA (USAID, 2010), are based on the preschool teachers' guide, Level I and Level II. To determine that the identified items adequately represent the measurement instruments, the content validity of the instruments must be assessed by calculating the Content Validity Index (CVI) since it is believed to be one of the most popular ways to evaluate the content validity of the measures of data collection (Amin, 2004; Polit et al., 2007). Lynn (1986) recommends that the content validity index (CVI) of the instrument be reviewed by at least 3 to 10 experts. Thus, the researcher handed over the instruments to six preschool teachers to review the content validity index (CVI) based on the preschool teachers' curricula or guides to reduce the items' level of difficulty and finally get approval from four preschool teachers. Accordingly, the Content Validity Index for the Environmental Science Scale (ESS) of 9 items, Early Mathematics Scale (EMS)(8 items), and First Language Scale (FLS)(9 items) were respectively calculated. Based on preschool teachers rated response on Content Validity Index, Environmental Science Scale (ESS) of 1 item, Early Mathematics Scale (EMS)(1 items), and First Language Scale (FLS)(0 item) had low CVI were removed its item score below .83. The relevant a CVI score should be .83 or higher, which is acceptable as suggested by (Polit & Beck, 2006; Lynn, 1986; Schilling et al., 2007). Hence, Content Validity Index results were accepted for the Environmental Science Scale (ESS) of 8 items, Early Mathematics Scale (EMS) (7 items), and First Language Scale (FLS) 9 items) to administer the test to children.

Tests were administered to examine the performance of preschool children during their stay over the last one and a half years of 2nd-year or KG 2 ; the extent to which preschool programs prepared and equipped children for grade one readiness; and in which learning areas the children performed well and in which they were struggling in three core learning areas namely Environmental Science Scale (ESS)(8 items), Early Mathematics Scale (EMS)(7 items), and First Language Scale (FLS)(9 items). The researchers rated each domain against children's knowledge based on their responses on a 2-point scale ranging from (1) correct to (0) incorrect. Higher scores (more correct responses) on the CAT show children are ready in preschool for early primary, whereas lower scores more incorrect responses) indicate that children in preschools are not ready for preschool for early primary.

Finally, the researchers, with the support of their assistants, administered the tests to each child on a one-to-one basis. Administration of the three scales for each child took on average 15 minutes. In addition in the main study, the internal consistency reliability (Cronbach's alpha) was checked, the result shows that the alpha (α) value of Environmental Science Scale (ESS) =.80, Early Mathematics Scale (EMS) =.79, and First Language Scale (FLS) =.83 and its results were considered acceptable (Cohen et al., 2007).

2.6. Data analysis

Data were analysed using descriptive statistics (frequency count, percentage, mean SD, and Chi-square test). Besides, inferential statistics, i.e., multivariate analysis of variance (Two-Way MANOVA), were used to explore the combined effect of sex and school location on the three learning areas.

2.7. Ethical considerations

First, the first researcher communicated to the school principal at each preschool about the objectives of the study, and the principal granted him permission. Then, the researcher administered the tests in the selected preschools to level II children aged six. Before they administered the tests, the first author communicated to the children that their participation was entirely voluntary and that they could withdraw at any time. Children were also instructed not to provide their names on the tests to protect their privacy. The researcher further assured participants that all data gathered would be used solely for the study and would not be disclosed to any third party.

3. Findings

3.1. Socio-demographic characteristics

Table 2 below depicts the socio-demographic characteristics of the children who participated in the study Initially, the tests were administered to 194 children (99 boys and 95 girls); however, the responses obtained from only 184 (92 boys and 92 girls) children were complete and usable. That is, all incomplete responses from 10 children were excluded.

Table 2. The socio-demographic characteristics

Variable	Categories	Frequency	Percent
School setting or location	Urban	92	50.0
	Rural	92	50.0
	Total	184	100.0
Sex	Boys	92	50.0
	Girls	92	50.0
	Total	184	100.0
Language of instruction	Amharic	92	50.0
	Sidamu Afoo	92	50.0
	Total	184	100.0

Table 2 above depicts the socio-demographic characteristics of the children who participated in the study. The data show equal distribution of the children in terms of their sex, school location, and language of instruction.

3.2. Performance of children in three learning areas

Table 3 below presents a chi-square test of two variables based on the results for the 2x2 table (i.e., the two variables together), i.e., (1) responses being correct or incorrect and (2) language of instruction(Amharic and Sidamu Afoo). It aimed to determine whether the number of students who answered the item correctly is significantly greater than the number of those who answered it incorrectly, and to compare the responses of rural and urban children to items. Morever, the mean and standard deviation (SD) for each item variable were determined based on a 2-point scale ranging from (1) correct to (0) incorrect in order to determine how close or far the responses of children matched the mean results.

In Table 3, the results showed that the first five of the eight variables (i.e., identify living and non-living things, recognize parts of a plant, distinguish wild and domestic animals, identify parts of the body, and differentiate human sense organs were not significant differences among children who were taught in Amharic and Sidamu Afoo. On the other hand, in the last three items (i.e. distinguish basic human needs, realise maintaining hygiene and cleanliness and recognize good code of conduct) there were statistical significant difference among children who were taught in Amharic and Sidamu Afoo. The results further indicated that there was a significant difference in proportion between those who answered the item correctly and those who answered it incorrectly in their responses in environmental science. As seen in item # 6 in, distinguishing basic human needs $x^2(1) = 15.42, p<.001$, indicating that children responded correctly (60.9%) whereas children responded incorrectly(39.1%); item # 8 recognizing good code of conduct $x^2(1)=14.87$, $p<.001$, shows that children responded correctly (55.4%) whereas children incorrectly responded (44.6%). Children who responded correctly were those whose language of instruction was Sidamu Afoo, better than those whose language of instruction was Amharic, and/or rural children were better than urban children.

Table 3. Chi-square tests result for comparison of children's responses in environmental science.

S	Variables	Language of	Children's Responses	Deceptive	Chi-square tests result

N		instruction	Incorrect	Correct	Total	Mean	SD	Value	Df	*P value*
1.	Identify living and non-living things	Amaharic Sidamu Afoo Total	42(45.7%) 38(41.3%) 80(43.5)	50(54.3%) 54(58.7% 104(56.5%)	92(100%) 92(100%) 184(100%)	.57	.497	.354[a]	1	.552
2.	Recognize parts of a plant	Amaharic Sidamu Afoo Total	59(64.1%) 48(52.2%) 107(58.2%)	33(35.9%) 44(47.8%) 77(41.8%)	92(100%) 92(100%) 184(100%)	.42	.495	2.70[a]	1	.100
3.	Distinguish wild and domestic animals	Amaharic Sidamu Afoo Total	53 (57.6%) 48 (52.2%) 101(54.9 %)	39(42.4 %) 44(47.8%) 83(45.1%)	92(100%) 92(100%) 184(100%)	.45	.499	.549[a]	1	.459
4.	Identify parts of the body	Amaharic Sidamu Afoo Total	54(38.7) 44(47.8%) 98(53.3%)	38(41.3%) 48(52.2%) 86(46.7%)	92(100%) 92(100%) 184(100%)	.47	.500	2.18[a]	1	.140
5.	Differentiate human sense organs	Amaharic Sidamu Afoo Total	46 (50%) 47 (51.1%) 93(50.5%)	46(50 %) 45(48.9%) 91(49.5%)	92(100%) 92(100%) 184(100%)	.49	.501	.022[a]	1	.883
6.	Distinguish basic human needs	Amaharic Sidamu Afoo Total	49(53.3%) 23(25%) 72(39.1%)	43(46.7%) 69(75%) 112(60.9%)	92(100%) 92(100%) 184(100%)	.61	.489	15.42[a]	1	.000
7.	Realise maintaining hygiene and cleanliness	Amaharic Sidamu Afoo Total	48(52.2% 31(33.7%) 79(42.9%)	44(47.8) 61(66.3%) 105(57.1%)	92(100%) 92(100%) 184(100%)	.57	.496	6.41[a]	1	.011
8.	Recognize good code of conduct	Amaharic Sidamu Afoo Total	54(58.7%) 28(30.4%) 82(44.6%)	38(41.3%) 64(69.6%) 102(55.4%)	92(100%) 92(100%) 184(100%)	.55	.498	14.87[a]	1	.000

Moreover, the highest mean score was reported on item distinguish basic human need (i.e., left to right) (*M*=0.61 and *SD*=0.49) whereas lowest mean score were observed on item read at recognise part of pants (*M*=0.42 and *SD*=0.49).

Table 4 below presents a chi-square test of two variables based on the results for the 2x2 table (i.e., the two variables together), i.e., (1) responses being correct or incorrect and (2) language of instruction(Amharic and Sidamu Afoo). It aimed to determine whether the number of students who answered the item correctly was significantly greater than the number of those who answered it incorrectly, and to compare the responses of rural and urban children to items. Moreover, the mean and standard deviation (SD) for each item variable were determined based on a 2-point scale ranging from (1) correct to (0) incorrect in order to determine how close or far the responses of children matched the mean results.

In the Table 4 the results indicated that there was a significant difference in proportion between those who answered the item correctly and those who answered it incorrectly, as seen in oral counting from 1 to 20, $x^2(1) = 6.45, p = .001$, indicating that children correctly responded (85.9%) more than children who responded incorrectly(14.1%); Simple subtraction, $x^2(1) = 4.89$, $p = .027$, shows that children correctly responded (48.9%) more than children who responded incorrectly(51.1%). On the other hand, there is no significant difference ($p > .05$) in proportion between children who answered the item correctly and those who answered it incorrectly in Sidamu Afoo and Amharic languages.

Moreover, the highest mean score was reported on the variable oral counting of number from 1 to 20 (i.e., left to right) (*M*=0.86 and *SD*=0.35) whereas lowest mean score was observed on variable read at simple world problem (*M*=0.29 and *SD*=0.45).

Table 4. Chi-square test results for comparison of children's responses in basic mathematics

SN	Variables	Language of instruction	Children's Responses			Descriptive		Chi-square tests result		
			Incorrect	Correct	Total	Mean	SD	Value	Df	*P value*
1.	Oral counting from 1 to 20	Amaharic	19(20.7%)	73(79.3 %)	92(100%)	.86	.349	6.45[a]	1	.011
		Sidamu Afoo	7(7.6%)	85(92.4%	92(100%)					
		Total	26(14.1)	158(85.9%)	184(100%)					
2.	Number identification.	Amaharic	32(34.8%)	60(65.2%)	92(100%)	.63	.485	.580[a]	1	.446
		Sidamu Afoo	37(40.2%)	55(59.8%)	92(100%)					
		Total	69(37.5%)	115(62.5%)	184(100%)					
3.	Number Ordering.	Amaharic	38 (41.3%)	58(63 %)	92(100%)	.61	.489	.365[a]	1	.546
		Sidamu Afoo	34 (37%)	44(47.8%)	92(100%)					
		Total	72(39.1%)	112(60.9%)	184(100%)					
4.	Number comparison.	Amaharic	43(46.7)	49(53.3%)	92(100%)	.47	.501	2.63[a]	1	.104
		Sidamu Afoo	54(58.7%)	38 (41.3%)	92(100%)					
		Total	97(52.7%)	87(47.3%)	184(100%)					
5.	Simple addition	Amaharic	54 (58.7%)	38(41.3 %)	92(100%)	.48	.501	3.13[a]	1	.077
		Sidamu Afoo	42 (45.7 %)	50(54.3%)	92(100%)					
		Total	96(52.2%)	88(47.8%)	184(100%)					
6.	Simple subtraction	Amaharic	55(59.8%)	37(56.5%)	92(100%)	.48	.501	4.89[a]	1	.027
		Sidamu Afoo	40(25%)	52(56.5%)	92(100%)					
		Total	95(51.1%)	89(48.9%)	184(100%)					
7.	Simple word problems.	Amaharic	60(65.2%)	32(34.8%)	92(100%)	.29	.454	3.20[a]	1	.073
		Sidamu Afoo	71(77.2%)	21(22.8%)	92(100%)					
		Total	131(71.2%)	53(28.8%)	184(100%)					

Table 5 below presents a chi-square test of two variables based on the results for the 2x2 table (i.e., the two variables together), i.e., (1) responses being correct or incorrect and (2) language of instruction(Amharic and Sidamu Afoo). It aimed to determine whether the number of students who answered the item correctly is significantly greater than the number of those who answered it incorrectly, and to compare the responses of rural and urban children to items. Morever, the mean and standard deviation (SD) for each item variable were determined based on a 2-point scale ranging from (1) correct to (0) incorrect in order to determine how close or far the responses of children the mean results.

In the Table 5 the results portrays that there is a significant difference in proportion between those who answered the item correctly and those who answered it incorrectly, as seen in spell out the alphabet from A to Z/U to ፕ, $x^2(1) =29.14, p<.001$, indicating that children correctly responded (64.7%) more than children who responded incorrectly(35.3%); letter sound discrimination, $x^2(1)=15.86$, $p<.001$, shows that children correctly responded (51.6%) more than children who responded incorrectly(48.4%).

Similarly, there is a significant difference ($p<.05$) in proportion between children who answered the item correctly and those who answered it incorrectly in the following items: identify at least 10 letters of the alphabet, letter sound identification, write three simple words, able to read a simple sentence and write his/her own name between Sidamu Afoo and Amharic languages.

On the other hand, there was no significant difference ($p>.05$) in proportion between children who answered the item correctly and those who answered it incorrectly in Sidamu Afoo and Amharic languages in items: follow reading directions (i.e., left to right) and read at least three simple popular words. Morevper, The highest mean score was reported on on item follow reading directions (i.e., left to right) (M=0.67 and SD=0.47) whereas lowest mean score were observed on item read at least three simple popular words (M=0.30 and SD=0.46). Additionally, Table 6 below represent percentage of students who scored the test items correctly and incorrectly.

Table 5. Chi-Square Test Results for Comparison of Children's Responses in First Language

SN	Variables	Language of instruction	Children's Responses			Descriptive		Chi-square tests result		
			Incorrect	Correct	Total	Mean	SD	Value	df	*P value*
1.	Spell out the alphabet from A to Z/U to ፐ	Amaharic	50(54.3%)	42(45.7%)	92(100%)	.65	.479	29.14[a]	1	.000
		Sidamu Afoo	15(16.3%)	77(83.7%	92(100%)					
		Total	65(35.3%)	119(64.7%)	184(100%)					
2.	Identify at least 10 letters of the alphabet.	Amaharic	50(54.3%)	42(45.7%)	92(100%)	.58	.495	11.81[a]	1	.001
		Sidamu Afoo	27(29.3%)	65(70.7%)	92(100%)					
		Total	77(41.8%)	107(58.2%)	184(100%)					
3.	Letter sound identification	Amaharic	58 (63%)	34(37%)	92(100%)	.48	.501	8.71[a]	1	.003
		Sidamu Afoo	38 (41.3%)	54(58.7%)	92(100%)					
		Total	96(52.2 %)	88(47.8%)	184(100%)					
4.	Letter sound discrimination	Amaharic	58 (63%)	34(37%)	92(100%)	.52	.501	15.86[a]	1	.000
		Sidamu Afoo	31(33.7%)	61(66.3%)	92(100%)					
		Total	89(48.4%)	95(51.6%)	184(100%)					
5.	Follow reading directions (i.e., left to right)	Amaharic	33 (35.9%)	59(64.1 %)	92(100%)	.67	.472	.613[a]	1	.434
		Sidamu Afoo	28(30.4%)	64(69.6%)	92(100%)					
		Total	61(33.2%)	123(66.8%)	184(100%)					
6.	Read at least three simple popular words	Amaharic	69(75%)	23(25%)	92(100%)	.30	.459	2.10[a]	1	.147
		Sidamu Afoo	60(65.2%)	32(34.8%)	92(100%)					
		Total	129(70.1%)	55(29.9%)	184(100%)					
7.	Write three simple words	Amaharic	61(66.3%	31(33.7%)	92(100%)	.42	.495	5.02[a]	1	.025
		Sidamu Afoo	46(50%)	46(50%)	92(100%)					
		Total	107(58.2%)	77(41.8%)	184(100%)					
8.	Able to read a simple sentence	Amaharic	69(75%)	23(25%)	92(100%)	.33	.470	4.84[a]	1	.028
		Sidamu Afoo	55(59.8%)	37(40.2%)	92(100%)					
		Total	124(67.4%)	60(32.6%)	184(100%)					
9.	Write his/her own name	Amaharic	61(66.3%)	31(33.7%)	92(100%)	.42	.496	5.69[a]	1	.017
		Sidamu Afoo	45(48.9%)	47(51.1%)	92(100%)					
		Total	106(57.6%)	78(42.4%)	184(100%)					

Table 6. Summary of children's test scores in percentages in three learning areas presented in percentages (correct vs. incorrect)

		Percentage of test scores		
SN	Learning areas	Correct	Incorrect	Total
1.	Environmental Science	51.63	48.37	100
2.	Basic Mathematics	54.5	45.5	100
3.	First Language	48.42	51.58	100

Table 6 illustrates that preschool children scored correct 50% and above in Basic Mathematics and Environmental Science. However, percentage of children who scored the test items correctly below 50% in first language.

Table 7. Descriptive statistics of achievement scores in three learning areas

Learning areas of children	N	Minimum	Maximum	Mean	SD
Environmental Science	184	0	1	.52	.202
Basic Mathematics	184	0	1	.55	.233
First Language	184	0	1	.48	.227

Table 7 shows the data help to examine in which leaning area children achieved better score and in which learning area they are struggling. To do so, the means and standard deviations score shows that children moderately performed in all three learning areas, i.e., environmental science, *M*=.52(*SD*.202), basic mathematics,

M=.55(*SD*=.233), and first language, *M*=.48(*SD*=.227). However, the lowest mean score is observed in first language *M*=.48(*SD*=.227) than both environmental science and basic mathematics.

3.3. Percentage of children in three learning areas based on school setting and sex

This research objective tries to assess among preschool level II children who perform well, in which areas they are struggling in terms of school setting (location) –urban and rural, and sex (boys and girls).

Table 8. Children's achievement by their sex in three learning areas.

SN	**Variables**		**Percentages of (100%)**			
		Sex	**N**	**Correct**	**Incorrect**	**Total**
1.	Environmental Science	Boy	92	25.6	24.4	50
		Girl	92	25.4	24.6	50
		Total	184	51	49	100
2.	Basic Mathematics	Boy	92	28.5	21.5	50
		Girl	92	26.1	23.9	50
		Total	184	54.6	45.4	100
3.	First Language	Boy	92	23.1	26.9	50
		Girl	92	25.4	24.6	50
		Total	184	48.6	51.4	100

As Table 8 portrays, no significant difference was observed between boys and girls in the test scores of basic environmental science. However, boys perform better in early mathematics, and girls also perform better in language (early reading and writing skills).

Table 9. Children's achievement by their school setting (location) in three learning areas

SN	Variables		Percentages of (100%)			
		School Location	N	Correct	Incorrect	Total
1.	Environmental Science	Urban	92	18.6	31.4	50
		Rural	92	29.6	20.4	50
		Total	184	48.2	51.8	100
2.	Basic Mathematics	Urban	92	25.7	24.3	50
		Rural	92	28.8	21.2	50
		Total	184	54.5	45.5	100
3.	First Language	Urban	92	18.6	31.4	50
		Rural	92	29.8	20.2	50
		Total	184	48.4	51.6	100

As Table 9 illustrates, rural children correctly respond much far better in test scores in three learning areas than children who learn urban preschools.

3.4. Combined effect of school setting and sex on the performance in three learning areas

Multivariate analysis of variance (Two-Way MANOVA) was used to explore a combined effect of sex and school setting (location) on three learning areas. Before running Two-Way MANOVA, basic assumptions for employing the statistical tool were checked, and the assumptions of data normality were not violated. In addition, no evidence of multicollinearity was observed. So, this suggested that the data were sufficient to run the statistics. Table 10 below presents results on the question raised.

Table 10. Multivariate tests for Two-Way MANOVA to explore the combined effect of sex, and school setting on the performance of children in three learning areas

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared

Intercept	Pillai's Trace	.934	836.950[b]	3.000	178.000	.000	.934
	Wilks' Lambda	.066	836.950[b]	3.000	178.000	.000	.934
	Hotelling's Trace	14.106	836.950[b]	3.000	178.000	.000	.934
	Roy's Largest Root	14.106	836.950[b]	3.000	178.000	.000	.934
Sex	Pillai's Trace	.052	3.284[b]	3.000	178.000	.022	.052
	Wilks' Lambda	.948	3.284[b]	3.000	178.000	.022	.052
	Hotelling's Trace	.055	3.284[b]	3.000	178.000	.022	.052
	Roy's Largest Root	.055	3.284[b]	3.000	178.000	.022	.052
School location	Pillai's Trace	.301	25.490[b]	3.000	178.000	.000	.301
	Wilks' Lambda	.699	25.490[b]	3.000	178.000	.000	.301
	Hotelling's Trace	.430	25.490[b]	3.000	178.000	.000	.301
	Roy's Largest Root	.430	25.490[b]	3.000	178.000	.000	.301
Sex * School location	Pillai's Trace	.040	2.461[b]	3.000	178.000	.064	.040
	Wilks' Lambda	.960	2.461[b]	3.000	178.000	.064	.040
	Hotelling's Trace	.041	2.461[b]	3.000	178.000	.064	.040
	Roy's Largest Root	.041	2.461[b]	3.000	178.000	.064	.040

*a. Design: Intercept + Sex + location + Sex * location*
b. Exact statistic

The multivariate effect of sex on the performance of children in three learning areas was statistically significant, Wilks' $\Lambda = .948$, $F(3, 178) = 3.28$, $p < .001$, partial $\eta^2 = .052$, indicating that boys and girls differed significantly on the combined basic environmental science, early mathematics, and early reading, and writing test scores.

The multivariate effect of school setting or location on the performance of children in three learning areas was statistically significant, Wilks' $\Lambda = .699$, $F(3, 178) = 25.49$, $p < .001$, partial $\eta^2 = .301$, indicating that urban and rural preschools differed significantly on the combined basic environmental science, early mathematics and early reading and writing test score outcome.

The interaction between sex and school setting was not statistically significant, *Wilks' Λ* = .960, $F(3, 178) = 2.46$, $p = .064$, partial $\eta^2 = .040$. This suggests that the effect of the sex of children on basic environmental science, early mathematics, and early reading and writing performances did not differ by preschool location.

Multivariate tests for between-subjects effects were conducted to further examine individual effects on basic environmental science, early mathematics, and early reading and writing test scores. Intercept results indicated a significant effect across the three domains, partial η^2= value shows it is a large effect size (ranging from .851 to .883) (Cohen, 1988). In addition, the interaction effect between sex and school setting was statistically significant only in early mathematics, $F(1, 184) = 4.31$, $p < .001$, partial $\eta^2 = .023$.

Regarding the effect of sex on the three learning areas, a statistically significant difference was revealed only in early reading and writing skills, $F(1, 184) = 5.9$, $p < .001$, partial $\eta^2 = .030$. With regard to the effect of school setting or location, statistically significant difference was revealed both in basic environmental science, $F(1, 184) = 27.44$, $p < .001$, partial $\eta^2 = .132$, and early reading and writing skills, $F(1, 184) = 62.71$, $p < .001$, partial $\eta^2 = .258$. In brief, both sex and school setting or location have a combined effect on the performance of preschool children.

Table 11. Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared

Corrected Model	Environmental Science	1.010[a]	3	.337	9.363	.000	.135
	Basic Mathematics	.494[b]	3	.165	3.149	.026	.050
	First language	2.616[c]	3	.872	23.015	.000	.277
Intercept	Environmental Science	48.724	1	48.724	1355.042	.000	.883
	Basic Mathematics	53.638	1	53.638	1025.119	.000	.851
	First language	42.417	1	42.417	1119.499	.000	.861
Sex	Environmental Science	.054	1	.054	1.513	.220	.008
	Basic Mathematics	.091	1	.091	1.738	.189	.010
	First language	.212	1	.212	5.596	.019	.030
School location	Environmental Science	.987	1	.987	27.444	.000	.132
	Basic Mathematics	.155	1	.155	2.959	.087	.016
	First language	2.376	1	2.376	62.716	.000	.258
Sex * school location	Environmental Science	.001	1	.001	.040	.842	.000
	Basic Mathematics	.226	1	.226	4.317	.039	.023
	First language	.132	1	.132	3.496	.063	.019
Error	Environmental Science	6.472	180	.036			
	Basic Mathematics	9.418	180	.052			
	First language	6.820	180	.038			
Total	Environmental Science	56.531	184				
	Basic Mathematics	64.571	184				
	First language	52.593	184				
Corrected Total	Environmental Science	7.482	183				
	Basic Mathematics	9.913	183				
	First language	9.436	183				

a. R Squared = .135 (Adjusted R Squared = .121)
b. R Squared = .050 (Adjusted R Squared = .034)
c. R Squared = .277 (Adjusted R Squared = .265)

4. Discussion

The findings showed that preschool programs did not prepare and equip children for grade one school readiness in the way they expected. Children achieved more than 50% test scores in only one of the three learning areas tested. However, this stage is a critical stage to prepare children for the future. The years of preschool that children spend can predict better achievement in maths and literacy skills during adolescent schooling (Sintayehu & Hussien, 2021; Tiruneh, et al., 2021). But children performed below 50% for basic language. Preschool education programs were positively associated with better academic performance of children, but the problem was access and equity. A study by Kim and Sabates (2023) showed that preschool attendance can determine the future academic performance of children. A study conducted Deyessa et al. (2020) in Addis Ababa in preschools showed that children perform better in language. But the findings of this study are reversed with Deyessa et al. (2020) findings due to the language policy currently implemented in the Sidama region. In addition, researchers Kim et al. (2022) studied persistent inequalities in early years' access and learning in Ethiopia; their findings showed that preschool participation is constantly positively associated with early grade primary education performance, and plays a great role in children's school readiness in pre-primary education.

In addition, one factor that can affect children's achievement is their sex of children. This study confirmed that boys perform better in early mathematics, and girls perform better in basic language. Likewise, girls outperform boys in maths in middle primary and secondary school, but there is no difference between boys and girls in preschool (Assefa & Sintayehu, 2019). The findings of the study also converged with a study conducted by Reilly et.al. (2019), which shows that girls outperform boys in language. Girls in preschool show faster development in language than boys, so they obviously performed better than boys at age six (Ponvannan et al., 2024). The gender gap in early preschool in maths performance is minimal (van de Weijer-Bergsma et al., 2022).

Besides, the study showed that though urban schools have relatively better facilities, infrastructure, small class size, and human resources, rural children perform better in all three areas; the root cause for this variation is the language of instruction used in urban and rural schools. These findings contradict the study conducted by Mbagaya (2021),

which showed urban children are more ready for early grade one than rural children. The root causes for the academic difference between urban and rural children are that the parents of rural children are less literate, so urban children perform better, and urban schools have more opportunities than rural schools to provide preschool education (Ahmed & Sintayehu, 2022; Kim & Sabates, 2023)

Thus, the urban school setting (location) affects children's scores on the tests. However, based on the first author personal observation of preschools in the whole Sidama region, urban schools have relatively better facilities, infrastructure, small class size, and human power, like teachers. Conversely, the test scores favour rural children over urban children. From the interview results, the researchers realized that one of the root causes for this is a language issue or policy.

The education policy of Ethiopia stipulates that the language of instruction for preschool education should be the mother tongue (Kim et al., 2022). However, in the Sidama region, public preschool children learn in two languages, i.e., Amharic in urban preschools and Sidamu Afoo in rural preschools. In Hawassa city, both the Amharic language and Sidamu Afoo are spoken. However, most preschool children in Hawassa city come from rural areas to pursue their education in the city. As the interview results of both school principals and the regional education bureau officers confirmed that, though policy directs language of instruction to be the mother tongue across the region, parents of children agreed that their children need to learn in the Amharic language in urban Hawass city administration.

One of the parent in X preschool stated that:-

> *I brought my child from a remote rural area to look for civilization and modernization. One aspect of this is that my child should learn the Amharic language, which is the official national and working language of Ethiopia. So, the purpose of bringing my child to the city is to learn the Amharic language. If he learns in Sidama Afoo, why should I bring him here? He already knows Sidama Afoo and can learn more from us at home after school hours (Interviewee P2)*

So, most children at urban preschools are in a dilemma. They are new to the Amharic language. They found themselves in confusion and under an identity crisis in the language attrition of their mother tongue, and were trying to learn the new Amharic language. Because urban children preformed lower test scores in all three areas than rural children.

5. Conclusions and Recommendations

This study examined the performance of preschool children during their stay at the program over the last year and a half, and the findings showed that preschool programs do not prepare and equip children for grade one school readiness in the expected way. Children achieved more than 50% test scores in only one of the three learning areas tested. From the three learning areas, i.e., environmental science, early mathematics, and first language, children are struggling slightly more in first language. In addition, the sex of children, boys perform better in early mathematics, and girls perform better in basic language. Besides, pertaining to school settings or location, though urban schools have relatively better facilities, infrastructure, small class size, and human resources, rural children perform better in all three areas; the root cause for this variation is likely to be the language of instruction used in urban and rural schools. Furthermore, school setting or location and sex of children have individual and combined effects on the performance of preschool children. Therefore, this study recommends that the regional education bureau should take immediate action to ensure that children in urban areas receive their education in their mother tongue without delay.

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