

**EARLY NUTRITION SUPPLEMENTATION AND PUPILS' CONTEXTUAL
FACTORS IN ACQUISITION OF READING SKILLS IN MANGOCHI
DISTRICT, MALAWI**

PhD. (EDUCATION POLICY, PLANNING AND LEADERSHIP) THESIS

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UNIVERSITY OF MALAWI

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M.Ed. (Policy Planning and Leadership) - University of Malawi

Submitted to the Department of Education Foundations, School of Education, in
fulfilment of the requirements for the degree of Doctor of Philosophy (in Education)

University of Malawi

October, 2023

DECLARATION

I the undersigned hereby declare that this dissertation is my own original work which has not been submitted to any other institution for similar purposes. Where other people's work has been used acknowledgements have been made.

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CERTIFICATE OF APPROVAL

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DEDICATION

I would like to dedicate this dissertation to students and researchers who are working tirelessly, engaging evidence, and unearthing solutions to challenges that pupils face in learning to read in their early life for prospects of functional literacy and lifelong learning.

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ABSTRACT

In Malawi, pupils' performance in reading has been dismal, particularly in the lower levels of primary school, despite implementing various initiatives to help pupils read and comprehend texts. There are no set of factors that are determined for a minimum package required to successfully deliver a reading curriculum within the context and environment of the pupils. Therefore, the study investigated the factors contributing to pupils' low acquisition of early reading skills despite decades of implementing reading instruction through an evidence-based curriculum in Lungwena, Mangochi District, Malawi. Additionally, the study modelled factors that significantly contribute to pupils' ability to develop reading skills. Using a quantitative approach, the study administered a standardised reading test for pupils with two years of primary education. Pupils with varying levels of nutrition supplementation took the test to determine the relationship between early nutrition supplementation and their reading ability. The mean reading scores of each group of students served as a proxy for this association. Furthermore, the study evaluated contextual factors relating to pupils, their households, and school resources to identify key elements that complement reading instruction at each grade level and, thus, necessitate customisation in developing and implementing reading curricula. The study found several patterns. First, pupils who mastered pre-reading skills performed higher on reading fluency tests. Second, pupils who received a high level of early nutrition intensity had high mean scores in reading fluency (40 correct words per minute), followed by a moderate nutrition intensity group (26 correct words per minute), a lower moderate group (29), and the least group with nutrition supplementation (30 correct words per minute). Third, pupil, household, and contextual factors contributed significantly to developing reading skills. Specifically, reading practice improved pupils' reading abilities by a factor of 0.53 ($p = 0.0001$). The number of times an adult read to a pupil at home increased the pupil's reading scores by a factor of 0.21 ($p = 0.0275$). Supplementary reading materials in homes improved pupils' reading scores by a factor of 0.2 ($p = 0$). Early nutrition supplementation improved pupils' reading abilities by 0.13 ($p = 0.05$). Absenteeism decreased pupils' reading abilities by a factor of 0.11 ($p = 0.013$); a well-utilised school library improved pupils' reading abilities by a factor of 0.39 ($p = 0$); pupils who had reading homework increased their reading abilities by a factor of 0.28 ($p = 0.018$). Lastly, homogeneity in the pupils' height, places where pupils practice reading, and the number of pupils per classroom did not affect how well a pupil developed reading skills. In conclusion, evidence-based reading instruction thrives on well-focused attention to contextual factors at the pupil, household, and school levels. However, fidelity in reading instruction alone cannot sustain reading gains and facilitate pupils' development of reading skills. The study argues that reading instruction thrives in a supportive environment in contexts in which pupils live. Breaking homogeneity in the pupil, household, and school factors is critical for pupils' varied and sustained reading performance.

TABLE OF CONTENTS

ABSTRACT.....	VI
LIST OF TABLES.....	XI
LIST OF FIGURES	XIII
LIST OF APPENDICES.....	XIV
ABBREVIATIONS AND ACRONYMS	XV
CHAPTER ONE	1
INTRODUCTION	1
1.1 CHAPTER OVERVIEW	1
1.2 BACKGROUND AND HISTORY.....	1
1.3 READING INTERVENTIONS IN MALAWI.....	11
1.4 STATEMENT OF THE PROBLEM.....	18
1.5 PURPOSE OF THE STUDY	19
1.6 MAIN RESEARCH OBJECTIVE.....	19
1.7 SPECIFIC OBJECTIVES	19
1.8 HYPOTHESES	20
1.9 SIGNIFICANCE OF THE STUDY	20
1.10 THESIS ORGANISATION	21
CHAPTER TWO	24
CONCEPTUAL AND THEORETICAL FRAMEWORK.....	24
2.1 CHAPTER OVERVIEW	24
2.2 DEFINITION OF KEY CONCEPTS	24
2.2.1 <i>Reading</i>	25

2.2.2 Nutrition.....	34
2.2.3 Household factors	40
2.2.4 Pupil factors.....	41
2.2.5 School resources	43
2.3 STUDY CONCEPTUAL FRAMEWORK DESCRIPTION	45
2.3.1 Relationship between pupils' nutritional status and their ability to acquire reading skills.....	47
2.3.2 The relationship between phonics instruction and pupils' ability to acquire reading skills.....	49
2.3.3 Pupil factors that affect individual access to reading skills	51
2.3.3 Inferred impact of school resources on the ability of pupils to acquire reading skills.....	55
2.4 THE CONCEPTUAL STUDY FRAMEWORK ON PUPILS' ABILITY TO LEARN TO READ	59
2.5 CONCLUSION.....	62
CHAPTER THREE	63
LITERATURE REVIEW	63
3.1 CHAPTER OVERVIEW	63
3.2 GENESIS OF FOCUS ON THE TEACHING OF READING TO PUPILS IN EARLY GRADES	63
3.3 THEORIES ON READING INSTRUCTION.....	66
3.3.1 Behaviourist Theory on learning	66
3.3.2 Cognitivism as a theory of reading.....	70
3.3.3 Constructivism Theory.....	73
3.3.4 Transactionalism theory of reading.....	75
3.4 REVIEW OF THE READING APPROACHES USED IN THE DESIGN OF THE MALAWI NATIONAL READING PROGRAMME	78

3.5 EVIDENCE OF THE EFFECT OF EARLY NUTRITION ON LEARNING OUTCOMES.....	82
3.6 HOUSEHOLD FACTORS THAT AFFECT CHILDREN ABILITY TO READ	93
3.7 EFFECT OF SCHOOL RESOURCES ON THE ABILITY OF PUPILS TO LEARN TO READ	103
3.8 CONCLUSION.....	109
CHAPTER FOUR.....	112
METHODOLOGY	112
4.1 CHAPTER OVERVIEW	112
4.2 RESEARCH PHILOSOPHY	112
4.3 STUDY DESIGN	117
4.3.1 <i>Pupil reading ability survey</i>	117
4.3.2 <i>Pupil survey</i>	120
4.3.3 <i>School resources survey</i>	121
4.4 SOURCES OF DATA.....	122
4.5 SAMPLING TECHNIQUES AND PROCEDURES	122
4.6 DATA COLLECTION PROCEDURES	125
4.7 DATA ANALYSIS	136
4.8 ETHICAL CONSIDERATION	153
4.9 SCOPE OF THE STUDY	154
4.10 CONCLUSION.....	155
CHAPTER FIVE	156
RESULTS AND DISCUSSION	156
5.1 CHAPTER OVERVIEW	156
5.2 DEMOGRAPHICS OF THE STUDY	156
5.3 DISCUSSION OF RESULTS	162

5.3.1 Association of pre-reading skills to reading fluency	162
5.3.2 Effect of early nutrition supplementation on the ability of pupils to acquire reading skills.....	168
5.3.3 Association of pupil physiology and access to learning resources regarding their ability to acquire reading skills.....	170
5.3.4 Association of household factors that affect pupil's ability to learn reading	177
5.3.5 Association of school resources with the ability of pupils to read	181
5.3.6 Modelling of key complementary elements to reading instruction in the teaching of reading	184
5.4 CONCLUSION.....	190
CHAPTER SIX	191
SUMMARY, CONCLUSIONS AND IMPLICATIONS	191
6.1 SUMMARY STATEMENT OF THE STUDY	191
6.2 STUDY CONCLUSIONS	193
6.3 IMPLICATIONS OF THE RESULTS	195
6.4 IMPLICATIONS FOR FUTURE RESEARCH.....	198
REFERENCES	201

LIST OF TABLES

TABLE 1: SNAPSHOT OF DATA COLLECTION INSTRUMENTS PER OBJECTIVE	135
TABLE 2: DEFINITION OF VARIABLES AFFECTING PUPILS' ABILITY TO READ	143
TABLE 3: DEFINITION OF HOUSEHOLD FACTORS THAT AFFECT THE ABILITY OF PUPILS TO LEARN TO READ.....	147
TABLE 4: DEFINITION OF VARIABLES FOR THE PATH DIAGRAM AT THE SCHOOL LEVEL	149
TABLE 5: GENDER AND GRADE OF THE PUPILS IN THE STUDY	157
TABLE 6: GENDER AND AGE OF PUPILS IN THE STUDY	158
TABLE 7: AGE SPLIT OF PUPILS BY STANDARD	158
TABLE 8: PUPIL RESPONDENTS BY NUTRITION INTENSITY, HOUSEHOLD AND PUPIL LEVEL	158
TABLE 9: SUMMARY OF RESPONSES FROM PUPILS BY TIMES THEY ARE READ TO AT HOME	159
TABLE 10: NUMBER OF SUPPLEMENTARY TEXTBOOKS FOUND AT HOME	159
TABLE 11: READING BOOKS FROM LIBRARIES OR PEERS FOR READING PRACTICE	160
TABLE 12: PUPILS' AVERAGE AGE, HEIGHT, AND HEAD CIRCUMFERENCE	161
TABLE 13: DATA ON SELECTED VARIABLES ON SCHOOL RESOURCES	161
TABLE 14: PHONICS READING INSTRUCTION HYPOTHESIS TEST RESULTS	164
TABLE 15: PUPILS IN READING FLUENCY BY NUTRITION SUPPLEMENTATION GROUP...	168
TABLE 16: GENERALISED STRUCTURAL EQUATION MODELING RESULTS FOR PUPIL FACTORS	172
TABLE 17: RESULTS OF THE STRUCTURAL ANALYSIS OF HOUSEHOLD FACTORS THAT AFFECT THE ABILITY OF PUPILS TO LEARN READING.....	179

TABLE 18: RESULTS FROM A GENERALISED STRUCTURAL REGRESSION ANALYSIS OF	
SCHOOL FACTORS AFFECTING PUPILS' READING ABILITY.	183
TABLE 19: RESULTS OF STRUCTURAL ANALYSIS OF CRITICAL PUPIL, HOUSEHOLD, AND	
SCHOOL FACTORS AFFECTING PUPIL READING ABILITIES	189

LIST OF FIGURES

FIGURE 1: NUTRITION EFFECT ON READING SKILL ACQUISITION	49
FIGURE 2: PHONICS APPROACH EFFECT ON ACQUISITION OF READING FLUENCY AND COMPREHENSION.....	51
FIGURE 3: PUPIL FACTORS THAT AFFECT THEIR ABILITY TO LEARN READING.....	54
FIGURE 4: IMPLIED EFFECT OF SCHOOL RESOURCES ON THE ABILITY OF PUPILS TO ACQUIRE READING SKILL.....	58
FIGURE 5: KEY FACTORS THAT CONTRIBUTE TO THE ABILITY OF PUPILS TO ACQUIRE EARLY READING SKILLS	60
FIGURE 6: PATH DIAGRAM FOR FACTORS THAT AFFECT PUPIL’S READING ABILITIES...	142
FIGURE 7: PATH DIAGRAM FOR HOUSEHOLD FACTORS THAT AFFECT PUPIL ABILITY TO READ.....	146
FIGURE 8: PATH DIAGRAM FOR SCHOOL RESOURCES THAT AFFECT PUPIL’S ABILITY TO READ.....	148
FIGURE 9: MODEL OF FACTORS THAT AFFECT PUPIL'S ABILITY TO ACQUIRE READING SKILLS.....	153
FIGURE 10: PATH ANALYSIS FOR MODELLING TEACHING OF READING	185

LIST OF APPENDICES

APPENDIX 1: READING TEST	223
APPENDIX 2: PUPIL QUESTIONNAIRE	255
APPENDIX 3: SCHOOL RESOURCES CHECKLIST	259
APPENDIX 4: INFORMED CONSENT FOR PUPIL INTERVIEWS.....	263
APPENDIX 5: CONSENT FROM THE MINISTRY OF EDUCATION TO CONDUCT THE STUDY	264
APPENDIX 6: RESEARCHER'S RESUME	265

ABBREVIATIONS AND ACRONYMS

AGLIT	Adolescent Girls Literacy Project
BLP/M	Basic Literacy Program of Malawi
CPD	Continuous Professional Development
EGRA	Early Grade Reading Assessment
ELOM	Early Learning Outcome Measure
GSEM	Generalised Structural Equation Model
ICC	Intraclass correlation coefficient
KG	Kilogrammes
MBTL	Malawi Breakthrough to Literacy
MSE	Mean Squared Error
MTTA	Malawi Teacher Training Activity
PCA	Principal Component Analysis
PIRLS	Progress in International Reading Literacy Study
RMSE	Root Mean Square Error
SEGRA	Strengthening Early Grade Reading for Malawi's Children Through Teaching Assistants
SEGREM	Strengthening Early Grade Reading in Malawi
SEM	Structural Equation Model
STATA	Statistics and Data
UNESCO	United Nations Educational, Scientific and Cultural Organisation

CHAPTER ONE

INTRODUCTION

1.1 Chapter overview

This chapter establishes the background to the study by providing the contextual and theoretical foundation for understanding the challenges within Malawi and other countries where research into the acquisition of reading skills has been attempted. It further outlines the statement of the problem, the purpose of the study, and its key objectives, hypothesis, significance, and thesis organisation.

1.2 Background and history

The acquisition of reading skills is a necessary prerequisite for the learning process. Students who have mastered reading skills achieve higher learning outcomes and critical thinking abilities (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2017). However, more than 617 million children worldwide do not achieve minimum proficiency levels in reading. Of these, 387 million children of primary school age will not read proficiently, nor will they sufficiently perform their studies by completing primary education (UNESCO, 2017).

The preceding implies that 387 million children will be left behind and cannot meaningfully sustain learning gains throughout their life. In addition, pupils who are left behind will not achieve high economic development since high education levels correlate with high social and economic returns (Psacharopoulos & Patrinos, 2018). The status quo is in opposition to significant efforts made to develop curricula and specialised reading programmes that have aimed to address the teaching of reading to pupils in early grades. Where such measures are in place, the emphasis has been on classroom-based reading instruction and the availability of various titles in the text so that pupils have a wide variety of textbooks and storybooks to read from and practice their reading skills, including comprehension. Notably, such dedicated reading programmes have been implemented in Sub-Saharan Africa. Countries such as Liberia, Ethiopia, and Malawi have since 2010 been implementing reading programmes to raise the skill profile of pupils enrolled in the early grades.

Several countries have adopted the teaching of reading through a phonics-based approach that stipulates a linear process of learning to read. This process begins with the naming of alphabet letters, followed by a repeated process in which pupils learn the sounds of the letters before teachers introduce them to blending the sounds into syllables. After that, the teachers introduce short words so that the pupils can create syllables and decode the letters in the words. Later, the teachers take the pupils through phrases and simple paragraphs and teach comprehension skills to enable the pupils to read with understanding (Graaff, Bosman & Verhoeven, 2009; Torgerson, et al., 2019; Woore, 2022).

Notably, the phonics-based approach lately introduced in several countries is grounded in Behaviourist Reading Theory. According to this theory, learning results from a stimulus, a response, and the association between the two. It posits that learning changes occur out of the form and frequency of the visual performance by the learner (Ertmer, 2013). The fundamental premise of the theory is that repeated actions by both the teacher and the pupil improve the pupil's capacity to learn to read. While this is consistent with the phonics approach, it is particularly noticeable in lower skill sets, such as letter naming, letter sounding, and syllable segmentation, where repetitions are effective. For high-order reading skills, such as reading fluency, the phonics approach thrives on the reading theories such as the Information Processing Model, Automaticity Theory, and Ehri and McCommick's Word Learning Theory. The Information Processing Model emphasizes knowledge of the visuals and sight words as aiding reading fluency rather than the gains attributed to behaviourism (Palmer, et al., 1985). Therefore, much as behaviourism is fundamental to teaching phonics, higher-order reading tasks such as reading fluency require adaptation of theories, such as the Information Processing Model. Readers' differences in visualising and sighting words remain key in how well a pupil reads.

Similarly, the phonics approach emphasizes repetitions in the learning process and relies on the fundamental concept of automaticity. This assumption posits that with repeated practice, a pupil does not necessarily have to invoke reading algorithms or decode the words. Reading words in paragraphs or sentences becomes automatic with time, and thus pupils become more fluent at reading when they achieve automaticity competence (Rawson, 2010).

Despite the implementation of phonics-based reading instruction on the above-mentioned theoretical grounds, reading tests in the three countries that have implemented a phonics-based reading curriculum have revealed that pupils cannot read at the set benchmarks. For instance, in Ethiopia, a significant percentage of children in standard 2 read zero words correctly. In Sidama, the rate of non-readers was 69.2 percent, and in Oromiya, it was 41.2 percent. Only Harari (17.9 percent) and Addis Ababa (10.1 percent) have fewer than 20 percent zero scores, with the most significant regions (Sidama, Oromiya, Tigray, and Amhara) all having standard 2 zero scores above 25 percent. Even in standard 3, significant percentages of children remained non-readers: Somali (21.4 percent), Amhara (17.0 percent), Sidama (54.0 percent), and Oromiya (20.6 percent). Overall, in each of the eight (8) regions, at least 80 percent of children—and in the case of Sidama, 100 percent—were not reading at the expected oral reading fluency rate (Piper, 2010).

Similarly, in Malawi and Liberia, pupils could hardly read in English after four years of education. The evaluation of the effectiveness of the reading initiatives in Malawi and Liberia also showed that the programmes were cost-effective on pupil enrolment, e.g. Liberia had the highest net gain (1.25 times higher than Malawi at 1.20) on oral reading fluency. Nonetheless, the cost of delivering the programme in Liberia was high (11.56 times higher than in Malawi) due to a low enrolment (lowest by a factor of 16.53) (Lee, 2013). The above obtaining implies that the interventions, regardless of closely mirroring available evidence in teaching phonics and grounded theories of reading, lacked cost-efficiency regarding reading outcomes. Therefore, despite the level of investments made and the theoretical paradigm based on the development of the instructional approaches, textbooks, and reading titles, the reading interventions

lacked cost-efficiency in terms of reading outcomes. Pupils failed to read at expected levels or benchmarks in all the three countries.

The above notwithstanding, the driving factor in the cost-effective analysis of the reading interventions in reference was pupil enrolment. The pupil enrolment was the cost driver because the pupils could hardly read after going through a levelled reading test for the years they had undergone a particular reading approach customized to a specific country. Nevertheless, learning reading skills takes time; hence, the cost factor gets obscured with time, especially when the reading programmes begin to produce results after the teaching approach is taught to teachers and educational supervisors.

In the cases of Liberia, Ethiopia, and Malawi, however, it was observed that: (1) pupils who took the reading test could not read at expected levels or benchmarks; (2) the mean scores on reading for the pupils that took the reading test varied from country to country; and (3) all pupils were given reading tests in their vernacular languages; however, their performance in all three countries was below the expected benchmarks set by respective countries, essentially indicating that they were unable to read in their native languages. However, the pupils performed very well on listening comprehension, implying that they had developed an understanding of oral language; they could listen to a story, interact with it, and answer questions asked on a story whenever someone read it to them.

Interestingly, the foregoing discussion suggests that the impetus for developing reading programmes in Sub-Saharan Africa, specifically in the Malawi, Liberia, and Ethiopia case studies cited above, was the desire to boost pupils' early acquisition and mastery of reading abilities. For the reading interventions to address the low reading skills in

the early grades, teachers have received training in various reading instruction methods. Dominant among the methods used are the whole-word approach and the phonics-based approach. The whole-word reading instruction method is based on context schema, learning by doing, and community background knowledge of the physical space. In principle, the teaching routine involves introducing the lesson to pupils and generating words based on pictures and items familiar to the pupils' social context. The teacher then teaches words that correspond to the visual concepts so that pupils use them in their speech and writing based on familiarity with those words. Such ideas were inspired by concepts fronted by scholars, such as Piaget's support for children's role in learning, Vygotsky's notion of social context role in learning, and Dewey's concept of language art in learning to read (Bergeron, 1990). In their presentations and conclusions, these models appear to assume that a teacher plays a central role in the teaching of reading. However, the pupil's background and how that particular pupil uses their environment for continued reading practice and interaction with the text available within their environment, whether in schools, homes, or playrooms and spaces, has the potential to complement the reading performance of the pupils.

The effort to teach pupils how to read early in the aforementioned ways primarily depends on the teachers and the text available to the pupils. Other factors affecting how well pupils learn to read were not the focus of the reading interventions. The above-mentioned countries implemented the interventions assuming that all complementary factors contributing to pupils' ability to learn to read at the individual, school, and household levels would be universally accessible to all pupils enrolled in the reading programmes. Others assumed that, somehow, other interventions would sort out those factors to ensure they are well-conditioned and complement reading learning.

Research has shown that it is difficult to determine the causality between early human nutrition and cognitive development (Baskale, et al., 2009). Ethically, researchers cannot experiment with human access to nutrition, for example, denying others access to nourishment for the sole purpose of study control. However, attempts have been made to supplement pupils' diet at varied intensity levels. Such provisions are made for all research participants, albeit with varied intensities of nutrient-rich food provision. The variation in food supplementation has enabled researchers to study the effect of nutrition on a variety of cognitive processes.

Therefore, in addition to testing the adequacy of the fundamental theories that formed the basis for a phonics approach, it is evident that the context in which instruction is delivered is also significant. Thus, it is critical for the study to evaluate these contextual factors in depth to determine the extent to which they affect the reading performance of the pupils. In this regard, the study looked at nutrition, individual pupil, school resource endowment, and household characteristics as complementary contexts requiring examination to determine critical factors that should complement a reading theory and approaches for successful delivery.

Research has shown that nutrition is likely to have several influences on the development of the brain. For example, results of animal studies suggest that nutrition can affect the brain's macrostructure (e.g., development of brain regions such as the hippocampus), microstructure (e.g., myelination of neurons), and level and operation of neurotransmitters (e.g., dopamine levels or receptor numbers), all of which can affect

cognitive development (Gómez-Pinilla, 2008; Cusick, 2016). The timing of nutritional influences on the brain is also essential. According to scientists, there are critical periods of rapid brain growth and development, from gestation until the first two years of life. However, some studies show that the frontal lobes of the brain grow beginning at 6 months of age and throughout one's life. These frontal lobes are responsible for higher-order cognitive functions such as planning, strategy formulation, and problem-solving. Such growth spurts in the brain's frontal lobes occur at ages 2, 7, 9, and 15 (Bryan, et al., 2004). Therefore, the lack of early and ongoing nutrition support for students hinders the development of cognitive skills such as strategy building, problem solving, and planning. These skills are quintessential to pupils' learning in early classes, including preschool. Essentially, this suggests that curriculum development should be set against efforts being made by other development actors to enhance pupils' nutrition. Where this is not addressed, implementers of reading curricula should make a deliberate attempt to increase cognitive skill development prior to exposing pupils to the reading curriculum's content. It is probably best to target such provisions in preschool with purposeful nutrition education to parents and caregivers to ensure sustenance and continuity in nutrition supplementation.

The above notwithstanding, additional research on nutrition and its linkages to cognitive development has revealed a correlation between early malnutrition and stable deficient cognitive growth (Morley & Lucas, 1997). Critical aspects of the findings show that early deficiencies in protein and iron impaired the ability to interact socially, implying restrictive behaviours in research subjects with great potential to learn slowly. The researchers observed that these behaviours were more prolonged in children that were deficiently nourished in their early years compared to those who received early

stimulation, had access to early nourishment and were well-nourished throughout the study period. Similar studies conducted in Guatemala (Freeman, et al., 1980) involved two groups of pupils, with the first group receiving vitamins and minerals fortified with high-intensity protein-calorie supplements. In contrast, the second group consisted of voluntary participants who received vitamin and fortified supplements that lacked protein and contained fewer calories per serving. A cognitive test was administered to the pupils from both villages. Pupils who received dietary supplements with a high concentration of protein calories performed better than those who received supplements with a lower concentration of protein calories. The study also ascertained that nutritional intake, independent of the social factors and the environment in which pupils live, affected their cognitive development. Furthermore, a confirmatory analysis revealed that children who got food supplements with a high protein-calorie content performed better on the cognitive tests than those who received food supplements with a lower protein-calorie content.

Further research has shown that access to classroom resources raises children's cognitive outcomes. For example, a child with a place to sit in the classroom had better learning outcomes, as evidenced in performance assessments (Kasirye, 2009). Similarly, schools with resources such as libraries (Aina, et al., 2011) and a lower pupil-to-teacher ratio (Muijs & Reynolds, 2003) performed better in learning assessments than those without such resources. Other scholars have also identified continuous learning support provided to pupils as a critical factor in how well pupils learn. In addition, factors such as parental education level, peer learning support after school, and the availability of textbooks and readers in homes affect how well pupils learn (Sailors, et al., 2014). Further to the above, the availability of spaces conducive to

learning practice when pupils are at home and the language used at home showed that children's language and cognitive development are interlinked. Disparities between the language used at home and the learning language at school negatively influence pupils' cognitive development. It further reduces opportunities for promoting their ability to learn and perform at expected levels with peers with greater access to such factors as language and a conducive home learning environment (Adekunle & Christiana, 2016).

The preceding discussion demonstrates that, in addition to the emphasis on instruction in the early learning process of pupils, complementary factors such as pupils' nutrition at an early age and continued nutrient-rich food consumption and practices enhance pupils' cognitive ability and, consequently, their ability to learn. Individual pupil differences, school resources and endowments, materials available in homes, language and level of participation, vocabulary development in the pupils' homes, and their achievement in learning exhibit a similar association.

In summary, the background points to the importance of reading and preferences for phonics-based instruction in the highlighted countries. Further, research points to the complementary impacts of the household, individual, pupil, and nutrition on the reading outcomes of the pupils. However, the theory mentioned above and studies do not provide any practical insight into the causes of pupils' poor reading performance in the respective countries. The aforementioned research and literature do not indicate the extent to which these individual factors impact changes in pupils' reading performance and the combinations required to optimally maximise reading performance from a reading intervention based on such factors. Additionally, there is

a gap in the literature on the theory behind teaching reading through phonics and implementation research mentioned above. It does not explain why the pupils under the interventions could not read at expected benchmarks regardless of the theoretical underpinnings that suggest otherwise.

To further investigate the above-mentioned unanswered questions, the focus of this study was narrowed to Malawi reading interventions to understand the background and review interventions that have been implemented in the teaching of reading to date. Further, the study examines outstanding questions that may require further research or drive this study's investigation. Therefore, in the following paragraphs, a brief description of reading interventions implemented in Malawi to build and sustain gains in reading skills will be provided so that we may identify knowledge gaps and research questions that may form the basis of this study's research interest.

1.3 Reading interventions in Malawi

Like many other countries in the region, Malawi has struggled to find a better fit or approach to teaching children how to read and increase its educational outcomes. Over the years, Malawi has lagged in education outcomes, finishing second-worst in mathematics at standard five (5) and last in literacy at standard six (6) in the Southern African Region standardised tests for numeracy and literacy (UNESCO, 2014). The dismal educational performance of Malawi is happening against the backdrop that studies conducted before had informed curriculum choices on changes that occurred post-1994 when Malawi implemented a free primary education policy. At the time, Malawi implemented a phonics-based reading approach following a 'SOSA' reading

curriculum, a hybrid of phonics-based and whole-word reading approaches. The education outcomes during the time could not be said to be much better, but they were higher than in post-1994 (Malawi Government, 2015). A curriculum discourse began post-1994 when Malawi reviewed the reading curriculum and instruction approach with the facilitation of development partners. This review led to a substantial reliance on the whole-word approach of teaching reading in an Outcome-Based Curriculum. The curriculum was closely aligned with approaches implemented in the region, especially in South Africa (Chirwa & Naidoo, 2014). Pupils and teachers in Malawi have utilised this strategy, particularly in the early grades from 2000 to 2010, during which Malawi has not done well on the regional standardised tests in numeracy and literacy. A review of the textbooks used for teaching reading in English and Chichewa revealed that the number of words that pupils were subjected to was few and that the numeracy curriculum undermined the ability of pupils to learn more. These findings implied that pupils targeted to undergo the curriculum could do more than the curriculum demanded of them.

In 2010, Malawi's dismal performance on regional standardised examinations prompted policy talks that led to a re-evaluation of the approach to reading instruction. Such a discourse led to the revision of the reading curriculum to a curriculum focused on phonics and classroom instruction, as evident in the Malawi National Reading Strategy (Malawi Government, 2015). In addition, notable, critical adjustments that culminated from this review led to the design of textbooks that maximised additional words that the pupils could make after going through the readers.

Pupils in grades 1 through 4 have been taught to read using phonics-based approaches. The approach, implemented post-2010, has been highly scripted. Teachers are directed, step-by-step, in what they need to do to deliver the lessons through the Teachers' Guide, and the development of the reading approach follows the theoretical foundations of teaching phonics (Malawi Government, 2017). The phonics-based approach has led to the teaching of reading, where a pupil is instructed to comprehend the concept of words. The pupils are then instructed to learn the parts of the words. Then, sequentially learn their sounds and context-specific applications. This approach has been widely implemented in recent years to help pupils learn to read and maximise their potential.

Among other interventions implemented in the teaching of reading to boost reading outcomes post-2010 in Malawi included the following: Malawi Teacher Training Activity (MTTA), Basic Literacy Program of Malawi (BLP/M), Literacy Across the Curriculum, Malawi Breakthrough to Literacy (MBTL), Tikwere, Extensive Reading, EuroTalk, Complementary Basic Education (CBE), Adolescent Girls Literacy Project (AGLIT), and Literacy Boost (Wiener, 2010). Individual evaluations of these programmes showed improvements in the reading outcomes in the impact areas and provided the basis for learning in areas such as Design and Structure; Professional Development, Monitoring, and Supervision; Materials and Supplies; Content and Curriculum; Instruction and Assessment; and Community Involvement (Wiener, 2010). However, these interventions were not implemented at a large scale, nationally, and universally.

Further pilot reading interventions such as Early Grade Reading Activity (EGRA), Strengthening Early Grade Reading in Malawi (SEGREM), Learning to Read Activity, and Strengthening Early Grade Reading for Malawi's Children Through Teaching Assistants (SEGRA) were implemented between 2013 and 2016. As in the preceding example, these interventions succeeded in their respective implementation areas. This success was interpreted as the pedagogical designs' success, including the phonics method's trial to reading instruction. The lessons inspired the subsequent formulation of the National Reading Strategy (Malawi Government, 2015). The adoption of the strategy resulted in the conception of a nationwide reading programme that, beginning in 2017, practically universalised the phonics-based reading approach in standards 1 through 4 of the Malawi reading curriculum.

In addition to the theoretical underpinnings and results from the individual successes of the various interventions mentioned above that have informed the development of the phonics-based approach used in Malawi, the reading approach has been supported by substantial resourcing of textbooks and reading titles uniformly distributed to all schools in Malawi. The materials have been designed following the phonics-based approach, and efforts are made to ensure pupils have access to more texts than in the past. The materials have been distributed to pupils in all public schools across Malawi. The distribution and scripting of the approach have been designed to enhance equity in access to school resources, especially for reading instruction. This approach has led pupils to receive largely homogenous lessons, except for contextual considerations such as pupils' nutrition status, characteristics, household factors, and school resources (Nagarajan, Gonzales, & Hur, 2017).

However, the performance of Malawi pupils enrolled in grades 1 through 4 has not improved. Despite the change in the reading approach, which is now predominantly phonics-based and scripted for teaching integrity and providing the instruction as framed by the developer of the phonics-based curriculum to the teaching of reading, pupils continue to perform poorly on reading exams. A 2017 reading assessment revealed that pupils in standards 2 and 4 answered 61 percent (mean of 3.05 questions out of 5 questions) and 76 percent (mean of 3.80 questions out of 5 questions), respectively, on a listening comprehension test developed and standardised for pupils with the equivalent of two years of education in Chichewa, a local language. The pupils could not correctly answer any questions asked in English. Furthermore, when the pupils were asked to independently read a paragraph and answer questions about the story they had just read, Standard 2 pupils could not answer a single question in Chichewa.

In contrast to the performance of standard 2 pupils, Standard 4 pupils answered only one of five reading comprehension questions in Chichewa. This performance suggested that the pupils had only just begun to acquire comprehension skills at the end of four years of schooling. Furthermore, all pupils in standards 2 and 4 could not answer a single question from a reading comprehension test in the English language, indicating that they had not acquired the English vocabulary within the equivalent of four years of education (Nagarajan et al., 2017).

Nevertheless, the positive performance of the pupils in listening comprehension suggests that the pupils have enough vocabulary and context in Chichewa and cannot decode the words. This finding that pupils have the language and can successfully handle listening comprehension justifies a reading intervention that follows a phonics-based approach where decoding words is a significant focus before introducing comprehension strategies. In addition, the results indicate that teaching pupils to read fluently takes time and that reading gains are sustained over a long time.

The assessments above emphasised the phonics approach since the base investment in the Malawi reading curriculum was on phonics post-2013. The Malawi Government, through the Ministry of Education, redirected the teaching of reading to follow a phonics reading approach, despite evidence pointing towards the contributions of familiar languages used by pupils at home and teachers in classrooms to help pupils understand taught concepts. It is also unclear how the presence of a school feeding programme positively correlates with reading abilities. For instance, reviews of school feeding programmes have shown an increase in school attendance.

However, it remains unclear in the literature on the effect of the feeding programme on pupil nutrition status, which can be linked to pupils' cognitive abilities, particularly for children over the age of six (Lawson, 2012; Zache, et al., 2016; McDonnell, 2011). Therefore, the impact of consistent classroom attendance on reading results is not well explained in the analysis of the Malawi data. These assessments have also not attempted to link the school feeding programmes with improved nutrition. Therefore, there is a knowledge gap regarding the relationship between a pupil's diet and improved

cognitive skills and reading ability on the basis that research has proven a positive correlation between nutrition and learning in general (Dubno, 2010; Pollitt, et al., 1993; Grantham-McGregor, et al., 1997).

In addition, there is an element of language of home use that has been alluded to as a circumstantial reason behind pupil performance in English, especially in areas where Chichewa is a second language. However, the assessment did not do an excellent job of examining the effect of language by administering the reading tests in the home language used in those specific areas. Prior research attests that pupils' academic performance is enhanced if study concepts are explained to them in their home language and then maintained in the second language that students acquire as they progress with education (Langer, 2010; Kachiwanda, 2010).

It is evident from the preceding that the implementation of the reading curriculum in Malawi post-2014 assumed that pupils would be exposed to similar levels of elements such as household characteristics, school resourcing, access to early nutrition, household support, and others mentioned above. In addition, it is noted that the reading approach was based on a theoretical framework known to teach pupils to read faster than others implemented in Malawi between 1994 and 2014. However, there is no convincing indication that the assumptions underlying the tested theoretical framework and the results used to justify the implementation of the new curriculum and ways of teaching reading in Malawi were taken into account during implementation. Therefore, it is unclear how these contribute to the reading proficiency gains of the respective pupils.

Despite the changes in reading approach and the implementation of curriculum revisions for more than a decade, pupils in Malawian public schools are reading considerably behind the nationally defined goals of 30 words per minute for students with two years of primary education equivalent. This evidence suggests that a gap between theory and practice needs to be addressed comprehensively so that assumptions behind the curriculum revisions are supported and implemented alongside theory-based approaches for the benefit of Malawi students learning to read.

This gap in pupil performance, despite prior pilot successes, creates a research interest to investigate the design and delivery of reading curricula to identify the factors that would model a reading curricula delivery that sustains gains in reading and improves the reading ability of Malawi pupils. This determination will involve testing the phonics-based approach to determine if the instruction routines in the delivery of phonics support the acquisition of reading skills delivered in the study context. This also involves further investigation into the contextual factors that enhance the acquisition of reading skills and how these are associated with reading fluency among Malawian pupils in the study area. Combining the two study strands offers an academic inquiry into the grounding of theoretical instruction approaches to the contextual factors in delivery for successful implementation.

1.4 Statement of the problem

In Malawi, pupils' performance in reading has been dismal, particularly in the lower levels of primary school, despite implementing various initiatives to help pupils read and comprehend texts. There are no set of factors that are determined for a minimum

package required to successfully deliver a reading curriculum within the context and environment of the pupils. Therefore, this study investigates why pupils in Malawi are not reading at expected levels and model parameters that significantly deliver an effective reading intervention that enables pupils to gain reading abilities early in primary education.

1.5 Purpose of the study

The purpose of this study is to investigate factors at school, household and individual levels that have led to the low acquisition of skills and performance in reading for pupils in Malawi despite investments and efforts made to support the teaching of reading through phonics-based instruction and model factors that significantly contribute to pupils' acquisition of reading skills for a minimum reading package.

1.6 Main research objective

The study investigates why pupils perform poorly in reading despite the investments and efforts to implement a reading curriculum that purposes pupils to acquire reading skills in early standards of primary education primarily focussing on the effect of early nutrition supplementation and pupils' contextual factors on their reading abilities.

1.7 Specific objectives

- i Examine how the mastery of prereading skills by pupils affects their ability to gain reading fluency.
- ii Examine the effect of early nutrition supplementation on pupils' acquisition of early reading skills.

- iii Examine the association of individual pupil factors, household and school resource endowment factors with the ability of pupils to acquire reading fluency.
- iv Model key factors that complement reading instruction for pupils to acquire reading skills.

1.8 Hypotheses

The study tested the following hypothesis:

- i H₀ = Pre-reading skills do not predict the acquisition of reading skills and the ability to read early in life.
- ii H₀ = Nutrition does not affect the ability of pupils to learn reading.
- iii H₀ = Pupil differential access to household and school resources does not affect their ability to learn reading.
- iv H₀ = Contextual factors in the Pupil's environment do not affect their ability to learn reading.

1.9 Significance of the study

The study investigates the extent to which the assumptions underlying behaviourism, information processing, and automaticity theories of reading, which inform phonics-based reading instruction, hold true when applied to the study context. The results will contribute to the knowledge gap regarding the theories' adequacy in explaining pupils' performance in acquiring reading skills.

Furthermore, the study extends the analysis to contextual environments within which pupils undergo phonics instruction. This research will generate results that conceptualise how pupil characteristics, school resource endowment variations, and household support model a reading intervention that optimally supports the acquisition of reading skills by pupils enrolled in early grades of primary education. This model will contribute to the academic debate on concepts that define and model a reading intervention required to inform reading curriculum designs and to supplement the contextualised delivery of reading curriculum within the implementation environments.

Furthermore, the study will provide a platform for curriculum planners and implementers to appreciate other factors in delivering a reading programme besides reading instruction, textbook development, and scripting instruction delivery for implementation fidelity. The study results will give curriculum planners and implementers a more comprehensive view of the context and environment in which the curriculum is developed and implemented.

1.10 Thesis organisation

The thesis is divided into six chapters. This chapter provided a backdrop and context for the study to understand the significant challenges and gaps in early reading.

Chapter Two discusses the conceptual and theoretical framework for the study, where key concepts are defined, and theories are expounded and related to the study. After that, the study's conceptual base is crystallised and graphically presented. This

conceptual framework lays the architecture of the study and grounds the questions answered in the study.

Chapter Three reviews the literature on reading, focusing on the evidence available in the literature that determines the investments made in reading curricula across the globe, with particular attention placed on Malawi as a geographical assessment subject. After that, the chapter discusses the literature and evidence that links the attendant factors at the pupil, household, and school level to how well pupils learn to read. This is against a backdrop that theory-based curriculum, instruction and context curricula must complement each other. The chapter concludes by identifying critical gaps in the evidence, and providing a basis and rationale for the current study.

Chapter Four outlines the study's methodology in searching for and organising the information, its analysis, and the presentation of the findings. In addition, the chapter describes the study design and justifies its selection based on its philosophical underpinnings, which also informs the study approach. Finally, the data collection methods or techniques, tools, and data analysis are presented to ensure that other researchers can use the methods to collect the same information, analyse it and reach comparable conclusions.

Chapter Five presents the study results or findings concerning the literature review and conceptual and theoretical frameworks. This chapter will compare the study's findings to those of other researchers. The chapter will elucidate the gaps in the literature and highlight areas where the results are consistent with those of other researchers on the topic or similar areas of study interest.

Chapter Six summarises the study and concludes with a discussion of the key findings and implications for future research in areas requiring improvement. The chapter also states the main argument of the thesis, namely that reading instruction thrives well where the social environment and nutrition of the pupils are well managed. In other words, eating improves students' cognitive capacities independent of the quality of their education. In addition, the social environment offers the necessary support structure for students to practise reading to gain reading abilities; therefore, it is a crucial area in the development and implementation of a reading curriculum.

CHAPTER TWO

CONCEPTUAL AND THEORETICAL FRAMEWORK

2.1 Chapter overview

This chapter provides a conceptual framework that grounds the study. The chapter first defines the key concepts in the study, followed by their philosophical underpinnings and linkages to the literature on the concepts.

2.2 Definition of key concepts

Several sub-concepts inform the central concept of the study, which is reading. In this study, reading is central to the study's attempt to understand why pupils in Malawi cannot read at standard benchmarks despite changes in the reading curriculum design, implementation modalities, and levels of dedicated financing. Previous research findings have highlighted key concepts complementing how well pupils learn to read. These findings are in addition to the training teachers receive to manage the reading instruction of pupils in the early grades of primary education. Furthermore, research has identified reading materials that schools are tasked to collect and distribute to pupils for after-school use and continued learning as another key ingredient in teaching reading.

Furthermore, the study is based on the notion that school resources vary. Moreover, schools with adequate resources will have options for managing those resources and providing pupils with access to teaching and learning materials that promote academic success. Consequently, despite getting comparable standardised and scripted reading instruction, students in well-resourced schools are likely to perform better than those in less-resourced schools.

2.2.1 Reading

Reading is both a concept and a process with numerous definitions. Although there are numerous definitions, reading generally entails making sense of printed words, which involves recognising the words and understanding their meanings (Wixson & Peters, 1984; Hoover & Gough, 1990; Kamil, et al., 2000; Frankel et al., 2016; Sieber, Platzer, & Schuster, 2018).

In this study, reading proficiency is used to categorise readers. This study distinguishes between high-level and low-level reading proficiencies. This distinction presupposes that pupils with higher level reading skills have high reading scores and the ability to interact with texts. In contrast, the pupils with low reading scores have low-level reading skills and exhibit difficulties understanding texts. Therefore, pupils with poor reading proficiency cannot demonstrate the reading proficiency skills that are typical and consistent with pupils with better reading proficiency (Lee & Musumeci, 1988). In other ways, those who cannot decode letters and read syllables and familiar words cannot comprehend a passage they cannot read proficiently. However, this view is mechanistic because it confines learning to read to mastery of prereading skills and precludes those that can read through mastery of the whole word approach to reading.

Nevertheless, pupils can read whole-words texts even if they lack the phonics skills necessary for acquiring prereading skills. This noteworthy observation is evident in pupils who learn to read using approaches other than phonics.

For instance, the whole-word approach to learning to read, where sight words and the context in which the word is introduced are important as opposed to the mechanical decoding process promoted in the phonics-based approach to reading instruction. The pupils using other approaches to reading besides the phonics-based approach will, at a minimum, have challenges decoding the letters in the word just read. Nonetheless, with regular practice, such pupils will read the words in the text without hesitation. The aforementioned challenges motivate the tendency to define reading through hierarchies and rank readers according to the mechanics ascribed in the phonics-based reading approach. This approach ranks the skills from low-level text decoding to comprehension of the text read. This motivation opens the proficiency view of reading to more scrutiny as a definition of reading instead of a process or stage in reading. It is at this stage in the process of reading that the measurement and classification of readers form the basis of this study. Therefore, the study recognises the definition of reading as making meaning of the printed text. However, the study analyses reading proficiency to determine how well pupils can read based on individual, school, and household factors that influence their reading ability.

Regardless of the issue of reading proficiency hierarchies, it is generally acknowledged that reading is a product of decoding and linguistic comprehension skills (Hoover & Gough, 1990). Therefore, the definition of reading appears to be limited to two parts:

text decoding skills and reading comprehension. In recent years, however, the definition of reading has been expanded to include the reader's ability to reflect on written texts and use these texts as tools for attaining individual and societal goals, often known as 'reading to do'. In this sense, the Progress in International Reading Literacy Study (PIRLS) defines reading as the ability to comprehend and use those written language forms required by society and valued by the individual. Readers can construct meaning from texts in a variety of forms. They read to learn and participate in communities of readers in school, in everyday life, and for enjoyment (Mullis, Martin, & Sainsbury; 2016). Worth noting is that the emphasis in the definition of reading is shifting from demonstrating fluency and basic comprehension to the ability to apply the text read to new situations or projects.

While the study accepts the general definition of reading as making meaning out of the text, the study uses reading fluency to proxy reading proficiency within the reading process. The study duly acknowledges that reading fluency is a stage in the process of reading. In addition, the study uses reading comprehension and extended reading comprehension as part of the duly measured products to ascertain and profile young readers. Therefore, reading fluency is defined as reading accurately at a quick rate with appropriate prosody, as espoused by Gilakjani and Sabouri (2016).

Cognisant of the reading profiling levels introduced above, the study investigated the process a pupil must undergo to reach such a stage in acquiring reading skills and reading fluency. Therefore, the study's reading concept also considers the prereading skills that pupils must acquire before developing the skills to read well and fluently.

Thus, the reading concept will also encompass the pupil's ability to decode text within a specific timeframe, vocabulary building, letter-sound knowledge, and sight word fluency. In doing this, the elements needed for fluent reading and how they relate to each other in a multilayered fashion in young readers were discussed. Furthermore, the implications of this model in developing and assessing reading fluency are examined in relation to the preceding definition of reading.

Regardless of the theory underpinning the teaching of reading through a phonics-based approach, the theoretical base assumes that a pupil learns to read by first mastering the prereading skills (letter naming, letter knowledge, letter sounds, and syllable segmentation). Furthermore, this process precedes decoding the letters, reading and making words before proceeding to meaning-making out of the letters one reads. Other factors, including cognitive, affective, socioeconomic, background, and text affect how pupils grasp and implement the approaches in their attempts to read fluently.

To gain a deeper understanding of how cognitive factors such as working memory and anxiety influence pupils' reading ability, structural modelling of 330 children's ability to solve verbal and non-verbal mathematics revealed that working memory plays a crucial role in the ability of pupils to solve verbal mathematics. Mathematical reasoning was significantly influenced by reading comprehension and anxiety (Wu, Chen, Battista, Watts, Willcutt, & Menon, 2017). The study showed that cognitive factors, such as working memory, influence pupils' ability to comprehend a text. In addition, anxiety caused by a failure to comprehend a text hinders a pupil's ability to make the meaning of words read. Therefore, regardless of the reading approach pupils are

subjected to, their working memory is impacted if they cannot read and comprehend within a given timeframe. As a result, they are less capable of comprehending the subject matter. Therefore, cognitive factors should be central to a reading approach, as they provide a framework within which a pupil can successfully engage in academic work. Notably, two critical issues are at play: general language comprehension and retrieval in response to visual input, regardless of whether the information is linguistic. Therefore, text knowledge and granular structural process in reading acquisition cannot be seen as the primary source of learning to read. Instead, consideration must be given to the background language and vocabulary of the pupil, as well as the cognition and retrieval of the text's meanings, regardless of the order of their placement. This aspect of retrieval is critical in understanding the text that pupils read. As the ability to read is not universally possessed by pupils, developing reading instruction necessitates thoughtful consideration.

Another study on reading disorders, mathematics, and attention examined the relationships between phonological awareness, numerosity, working memory, and processing speed in relation to reading, mathematics, and attention. The study showed that working memory and phonological awareness affect pupils' ability in reading and mathematics. Furthermore, numerosity was highly correlated with the co-occurrence of mathematics and attention (Child, et al., 2019). This finding indicates that the pupil's attention during the learning process is crucial for the development of later-used cognition. As this pertains to the phonological development of pupils, they must be attentive during the learning process, regardless of the theories that inform a learning curriculum. Therefore, the ability of teachers to develop an approach to teaching that captures the pupils' attention can be institutionalised within the curriculum delivery.

However, the curriculum developers need to be aware of the context within which the curriculum will be implemented. For instance, teaching content that requires much attention from the pupils will be ideal for smaller classrooms with a low pupil-to-teacher ratio. This case is evident when compared to classrooms with a large number of students, given the attention span of the pupils and the time limit within which a teacher is expected to deliver instruction.

These findings pertain to the phonics-based teaching approach that pupils have to undergo in classrooms that have an average of sixty-three (63) pupils, and in some cases, more than one hundred (100) pupils per classroom and a teacher (Malawi Government, 2020). In this instance, pupil attention affects cognition and the ability to learn to read; therefore, the design of a reading curriculum must go beyond theories on reading, and the concept of reading in this thesis, will consider class size as a proxy factor for teachers' ability to maintain pupil attention. In contrast, pupils learn and later influence reading ability as measured by reading fluency and comprehension.

Further studies have linked reading ability to the execution of eye movements, decoding, and speech production, concluding that an emphasis on decoding slows reading fluency (Primativo, et al., 2016). This position implies that the concept of reading through a phonics-based approach, which thrives on the ability to decode text, pronounce letters and text, and make meaning, may potentially slow the number of words a pupil can read in a text. Therefore, the conceptual definition of reading in this study will acknowledge the possibility of having pupils learn to read through mechanistic phonics, which has the potential to slow down pupils' reading speed. Even

though meaning-making is the primary goal of reading instruction in academic curricula, there is no scientific consensus on the order in which fluency and meaning-making must occur for pupils to become proficient readers.

In addition to the discourse on cognition related to reading instruction, studies on children with reading disabilities have shown that such children face cognitive and socio-emotional challenges resulting from their inability to read at the same rate as their peers. However, given support for cognitive resilience, which essentially happens through dedicated positive reinforcements and supportive instructional environments, pupils with reading disabilities can be resilient and develop cognitive abilities to read. Further research indicates that their inability to read culminates in emotional breakdowns that, if unaddressed, may further undermine their reading efforts. Therefore, it is paramount that such pupils receive socio-emotional support to build their resilience to learn to read. Peers and supportive adults, including teachers greatly value such assistance (Haft, Myers, & Hoeft, 2016).

Reading instruction necessitates a focus beyond curriculum theory. It extends attention to the supportive mechanisms set by the curricula, school, and home environment for pupils with reading disabilities. This study promotes inclusion and reading practice for pupils with an innate potential to graduate with abilities comparable to their peers. Therefore, the concept of reading theory cannot be considered in isolation. It requires supportive mechanisms to be put in place for emerging readers, those with reading difficulties to utilise the support of peers reading at the appropriate level, and teachers to have the capacity and opportunities to support remedial reading, whether in a

classroom setting or at home. Such support fosters the cognitive and emotional resilience required for students with difficulties to continue on the reading trajectory and maintain reading gains whenever they are registered.

Peng & Kievit (2020) contends that academic and cognitive skills are essential for pupil development. Such research has revealed that reading and mathematics performance predict cognitive abilities (i.e., working memory, reasoning, and executive function) and that the relationship is bi-directional. Further gains are due to quality classroom instruction, which builds the ability to read in disadvantaged pupils, particularly those from low socioeconomic backgrounds. These findings highlight that theories of reading should not only be structural, but also strive to enable teachers to deliver instruction with ascertained quality and consistency so that pupils from low socioeconomic quintile households are not left behind. The backgrounds of the pupils are not identical. Therefore, the pupils require ‘differentiated, levelled, and customised support. This approach is challenging for teachers in overcrowded classrooms. It may compromise the delivery of reading strategies grounded in sound academic theory. Thus, reading proficiency and its implementation success in this concept extend to the socioeconomic status of pupils, as measured by variables such as the number of meals they take in a day and the availability of resources in their homes.

Scientific research has shown that pupils develop an emotional attachment to reading based on the characters they interact with through text read to them. Pupils’ exposure to such characters depends on the support they receive at home either through being read to or reading by themselves. This opportunity depends on their home environment

and their access to non-academic texts (Chansa - Kabali & Westerholm, 2014; Yamashita, et al., 2017; Price & Kalil, 2018; Ramirez, et al., 2019). This love of reading is contingent on the earlier distribution of levelled reading materials to pupils. With this affection, pupils seek out additional texts and narratives to develop their reading ability further. In addition to reading instruction based on phonics reading theories, the ability to read fluently and with understanding is further enhanced by reading diverse titles from supplementary readers in addition to required textbooks. The reading definition in this concept will thus extend to affectionate reading and the measurable effects this has on the success of a reading approach measured by reading fluency and comprehension.

In summary, the conceptual definition of reading provided by this study extends beyond the theory and mechanics of reading instruction associated with a phonics-based approach. The conceptual contributions of some of the factors that contribute to the establishment of reading in early stages, such as cognitive, affective, and socioeconomic factors, background, and text availability in pupils' homes, are considered as key to the pupils' ability to learn to read. These factors significantly contribute to the effectiveness of classroom-based instruction on reading. Therefore, these elements are conceptualised and discussed in subsequent sections of this conceptual framework. This discussion is for the examination and analysis of modelling a reading intervention contextualised to the socioeconomic characteristics of the area where early-grade reading instruction is implemented. This conceptual position investigates the context in which reading instruction occurs to complement reading instruction. This position is critical because theory-based approaches do not exist in a vacuum; they insist on contextualising the concepts.

2.2.2 Nutrition

Nutrition is defined in this study as the absence of stunting in children, following the World Health Organization Child Growth Standards median (World Health Organisation, 2019). These standards recognise that many children suffer from some degree of growth faltering as the entire length-for-age/height-for-age z-score distribution is shifted to the left, indicating that all children, not only those falling below a specific cut-off, are affected. The conceptual definition also indicates that growth retardation typically begins in utero and continues for at least the first two years of post-natal life. It also posits that linear growth failure is a marker of multiple pathological disorders associated with increased morbidity and mortality, loss of physical growth potential, reduced neurodevelopmental and cognitive function, and an elevated risk of chronic disease in adulthood. The severe irreversible physical and neurocognitive damage accompanying stunted growth poses a significant threat to human development, including the ability to learn (Onis & Branca, 2018). In this respect, the conceptual framework looks at attempts made in the study population to increase the growth of children sampled for the reading assessments through postnatal nutrition supplementation. The concept herein also benefits from nutrition education or food literacy provided to parents of the children in the study population. The supplementation of food postnatally has been shown to have consistency in food choices based on nutrition content and its effect on growth. Such studies have also shown consistency in the practice of food choices in the long term (Krause, et al., 2018). Therefore, the study assumes that participating parents will continue to provide nutritious food for their children after nutrition supplementation initiatives.

With conceptual definitions of nutrition in this study bordering on growth and food literacy, this study extends the assessment to focus on pupil nutrition status, household

factors, and school resources. This extension is based on the non-homogenous factors prevalent in the pupil context and contributes to early reading skills. This position is held even though the pupils attended a homogenous reading curriculum with homogenous teaching, learning supplies, training mentorship, and coaching provisions that are scripted to maintain fidelity in the implementation.

Nutrition in this study is based on the nutrition supplementation that pupils in Mangochi, Lungwena Area accessed through a study conducted by the Malawi College of Medicine on the effect of food supplementation on children's growth. The pupils were randomly selected at birth and enrolled in a nutrition study that sought to assess the impact of the provision of food supplements on children's growth. The children were provided with nutrition supplements in varying levels of nutrition intensity. However, all participating pupils received a nutritional supplement package to enhance their nutrition; consequently, their growth was enhanced in some way. The participating children were enrolled in the programme and supported with nutrition for thirty-six (36) months. Two research institutions, the College of Medicine of Malawi (now Kamuzu College of Health Sciences) and the University of Tampere of Finland, conducted the study in Lungwena, Mangochi District (in south eastern Malawi), from 2010 to 2013. The nutrition interventions provided to the children included four levels, as described below. Upon enrolling in the nutrition supplementation intervention, the children in the study were randomly assigned to one of the four groups.

- i) **Group A:** This group involved children who received a delayed Supplementation treatment. The treatment was introduced 18 months after birth. The treatment that the participating children received included counselling sessions for the mothers on complementary feeding, with the goal

of ensuring that each parent of the participating children was providing complementary foods as their child grew. In addition, the participating children in this group received Vitamin A every six months until they were 36 months old. Furthermore, the participating children received, through their mothers, one (1) kilogram (kg) of maize and soy flour every two weeks, equivalent to approximately 71 grams (g) per day. These participating children received the intervention on nutrition supplementation between 18 and 30 months of age. Note that the nutrition package for this group was delayed, even though the children were enrolled in the programme intervention.

ii) **Group B:** In this group, the participating children received a standard fortified spread. They were also given milk powder as a source of protein. In addition, the participating parents also received guidance on food preparation and complementary feeding of their young children, as well as the continuation of these practices following the nutrition intervention. Additionally, the children were given Vitamin A every six (6) months. In addition, the children in this group received 750 grams of fortified peanut spread each for two (2) weeks, which translated into fifty-four (54) grams of the spread per day. The duration of these interventions for the participating children was 18 months. The children were introduced at six months.

iii) **Group C:** The children in this group were given a modified fortified spread containing soy powder as the protein source. Parents or guardians of the children also received nutrition and complementary feeding guidance to sustain the practice of post-nutrition intervention. In addition, the children were given Vitamin A every six months. Each of the participating children were given 750

grams of fortified spread twice a month, translating into 54 grams of fortified spread per day, between 6 and 18 months.

- iv) **Group D:** The children in the fourth group were given Likuni Phala as a source of protein. In addition, the parents or guardians of the children were counselled on nutrition and food supplements in order to inculcate a nutrition culture regarding how they would support the feeding of the children following the nutrition intervention. In addition, the children received Vitamin A supplement every six months. The children also had access to one (1) kilogram of fortified maize or soy flour given to the families every two weeks, equating to 71 grams per day for children aged 6 to 18 months.

As stated above, the children were grouped randomly in various levels of nutrition intensity in order to track their growth. In addition, anthropometric measurements were taken to assess the children's growth. The primary objective of the study was to determine whether the intensity level of nutrition supplements affected the growth patterns of the children. The study revealed that the intervention did not cause significant growth differences amongst the children across the groups. However, there was marginal statistical significance for children enrolled in Groups 1 and 2 (considered high-nutrition intensity groups). This finding suggested a positive correlation between high-intensity nutritional supplements and children's vertical growth (Thakwalakwa, et al., 2009).

The above nutrition study marginally supported that nutrition affects the vertical growth of children. However, the levels of nutrition intensity present in the study provide an opportunity for further analysis of the children's cognitive ability. Therefore,

if followed seven years after the intervention and further studied for their cognitive abilities, which are proxied by reading skills, there is an opportunity to assess the effect of early nutrition on the pupils' ability to learn to read. Thus, based on evidence for early nutrition as a precursor for sustained growth and nutrition practices in human beings, the present study uses the groupings by the level of nutrition intensity to proxy the nutrition status of the children in the study area.

The study traces the children who have survived over the period, were enrolled in primary schools in Lungwena, Mangochi District, and learned to read during the study by accessing the homogenous reading instruction intervention described above. The goal here is to determine if early nutrition influences how well children learn to read, taking into account other factors such as household, school resources, and pupil factors that affect schooling opportunities for children in their unique ways based on their exposure to resources. The study assesses the impact of early nutrition, pupil, household, and access to school resources on children's reading ability based on their participation in a homogenous reading instruction intervention delivered by the Malawi National Reading Programme.

As stated previously, the phonics instruction programme implemented in Malawi is guided by the theory underlying the phonics-based approach to reading, which posits that if pupils master prereading skills before being introduced to words, they will be able to and comprehend the words they read. However, implementation and investment decisions did not consider the non-homogenous factors, such as the nutritional status of pupils at an early age. Therefore, this study examined the nutrition concept in two parts. The first part looked at the reading scores of pupils enrolled in each of the above-

described early nutrition supplementation intensity groups. This approach was used to determine whether there are differences in the reading abilities of pupils based on the intensity of nutritional supplementation they received in early childhood. In addition, the intervention on early nutrition supplementation provides an opportunity to assess any post-nutrition intervention effects that may be observed in the reading fluency scores of the pupil. These results provide a basis for determining what other factors should be considered when designing reading interventions in addition to the emphasis on reading instruction and text availability.

The second part examined the impact of cognitive nutrition development on pupils. This effect was examined through a review of the relevant literature cross-referenced with the primary data collected for this study. In this sense, nutrition was projected on the ability of pupils who participated in the Lungwena Nutrition Study and sat for the reading test. The nutrition factor was further traced in the pupils through anthropometric measures collected on the pupils before they sat for the reading tests. These anthropometric measurements served as the basis for assessing the nutritional status of the pupils in light of the nutrition intervention they received earlier in their lives and the varying levels of nutrition intensity they were exposed to. In addition to measuring the vertical growth of the pupils, the study also measured the head circumference of each participant as a proxy for the growth and nutrition status of the pupils whose primary data was collected.

Thirdly, the study also assessed the effect of nutrition in relation to other factors that have been found to influence how well pupils learn to read in the early years of their primary school. These additional factors included aspects of the pupil's home

environment that influence his or her ability to acquire reading skills. Other additional factors included individual pupil characteristics such as availability of places for the pupils to practise reading and individual support that they get on reading after school, which also affect how the pupils learn. In addition, the study was also informed by the interplay between school resource endowment and the ability of pupils to learn to read. Therefore, while nutrition was assessed on its own merits, an attempt was made to show the contribution of nutrition (if any) to the ability of pupils to acquire reading skills, taking into account the previously mentioned factors. Therefore, this study defined nutrition as described above. Each of the three scenarios is predefined when a reference to nutrition is made.

2.2.3 Household factors

The study explores household-based factors that, according to previous research, influence pupils' ability to learn to read. The study focused on factors such as the support that pupils receive at home and when learning to read. Specifically, it explores the support available to pupils to learn to read, including the number of times a pupil is read to at home per week. This factor was traced during the study as it is known that pupils build vocabulary whenever a peer or parents reads to them after school sessions (Bayless, et al., 2018). Notably, reading to pupils at an early age stimulates their desire to become familiar with the text and letter formation. This sensitivity includes letter names, sounds, and syllables, and the development of listening comprehension strategies that apply to reading comprehension is initiated when pupils can read independently. In addition to the reading practice support provided by peers or parents in the home, the study also considered the varying school resources available to each pupil in the households. Such resources included textbooks and reading materials

available to pupils at home. This inclusion was considered based on studies and research that has highlighted the importance of text and availability of reading materials to pupil practice in reading and later better learning outcomes (Pushpanathan, 2018).

In addition, the study examined the role a meal plays in preparing a learner to attend school. This factor was derived from research findings showing that a meal is essential to the pupil's preparation for learning before or after classes (Taha & Rasheed, 2017). Therefore, when evaluating the household factors in this study, a concerted effort was made to understand any reading performance variations that may have occurred due to the number of meals a pupil had access to in a day. This project also provided an opportunity to gain a deeper understanding of the connection between access to meals and reading performance, when considering factors such as reading practice.

2.2.4 Pupil factors

In addition to the household factors, the study assessed potential variations in pupils' ability to acquire reading skills based on individual factors that are unique to pupils whose reading ability was assessed. Such factors included the pupil's height. The height was chosen as a potential indicator for the nutritional status of the pupils well after the initial nutrition supplementation that the pupils selected for the test received, as mentioned earlier. Each pupil's anthropometric measures were collected prior to the reading test. The decision to include pupil height in the study was based on research indicating a positive correlation between pupil height and academic performance. Therefore, it was reasonable to anticipate that height differences would also impact the reading performance of the pupils in the study during the test. In addition to the above, the study also measured the pupils' head circumference to track their growth following

the early nutrition intervention described above. This helped the study monitor the continued development of the pupils after the first three years they were enrolled in the aforementioned nutrition supplementation study. In addition, the head circumference has positive associations with how well pupils read or learn, according to previous research (Nicolaou, et al., 2020; Dupont, et al., 2018; Veena, Krisnaveni, Wills, Kurpad, Mathayya, Hill, & Srinivasan, 2010). As a result, it was crucial to determine whether or not this relationship could explain any variation in reading outcomes, as the study sought to identify the underlying causes behind the poor performance of students on reading tests.

Concurrent with the understanding of the effect, if any, that meals have on the ability of pupils to learn to read, the study would also benefit from the types of meals (i.e., breakfast, lunch, or supper) that individual pupils took and how this affected their reading fluency scores. While there is no direct explanation or attempt to explain which meals influence pupil's ability to learn to read, individual preferences (voluntary or circumstantial) can help explain the non-homogeneous factors that distinguish each pupil as an individual. Therefore, it is crucial to understand these distinctions when designing reading approaches or interventions.

In addition, age, grade, and school attendance consistency were also included as possible factors within the pupil level vector variables. The study examined the ages of the pupils, the variance among them, and their reading test scores. This focus on age was made despite the fact that the reading test in the study was calibrated for students with at least two years of schooling. However, age differences also determine an

individual's interest in age-appropriate reading tests. This practice is especially the case in Malawi, where a test levelled for two years of education is linked to a pupil's age, which must be a minimum of seven years, since the education policy on enrolment into public primary schools in Malawi puts entry age into schools at six (6).

In addition to age, the study also considered the grade in which a pupil was enrolled. The cohort of pupils was expected to be in fourth grade at the time reading test data was collected, assuming perfect efficiency and the absence of repeating pupils. However, variations were anticipated due to pupil class repetition, dropout, and re-enrolment. Therefore, this variation is critical for determining whether enrolment in a higher class had an impact on how well the pupils acquired reading skills as measured by their performance in a two-year levelled reading test or vice versa. Furthermore, the study assessed the individual pupil characteristics and school performance variations that may be detected through how consistently the pupil attends classes. This approach is well-meaning in that the reading approach in Malawi is scripted and sequentially follows the phonics-based approach to teaching reading. Therefore, any pupil who misses the process due to class absenteeism must complete remedial work with the assistance of teachers who are equally overwhelmed with student numbers and rarely remediate absent pupils or slow learners. The inclusion of such a variable is a vector of factors that explain the individual differences in pupils that explained the variation in their acquisition of reading skills.

2.2.5 School resources

The study is well informed regarding the role that school resources play in the condition and standards of the learning environment and how this affects the pupil's ability to

learn. Several studies attest to the positive effect that well-resourced schools have on the ability of pupils to learn well (Burtless, 1996; Tordzro & Ofori, 2018; Hughes, 2014). Previous research has also shown that pupils often perform better in schools where there is access to clean spaces (Cook, 2019), low pupil to teacher ratio (Duflo et al., 2015; Waita, et al., 2016; Snilstveit, et al., 2017; Zeitlin, 2021), low pupil to classroom ratio and availability of texts (Singh, 2016) compared to schools where such resources do not exist. Therefore, the study collected data on a vector of variables indicating the availability of substitute school resources. Such variables included the availability of teaching and learning materials, libraries, adequate classrooms, staff rooms, teachers, water and sanitation facilities, and access to electricity.

In the vector of school resource factors, the study included the availability of libraries, with the research focusing on permanent or makeshift libraries, staff rooms, and book boxes kept by school personnel. This factor also included reading books available in schools for purposes of lending them out to pupils for classroom preparation time, home use, or other purposes, as long as a record was kept to trace the books and ensure that pupils were responsible for returning the books upon completion of the loan period. This was included on purpose in the school resource vector to validate whether the availability of school libraries has ever affected the way pupils learn to read at acceptable benchmarks in their early school years in the case study concerning others who have observed the availability of school libraries predicting pupils' ability to learn to read.

In addition, the study assessed the adequacy of classrooms at each school where participants were enrolled. This aspect of the evaluation was based on findings from other studies that indicate that pupils read well or learn better in schools with adequate classrooms and space for teachers to provide reading instruction and remedial support as needed (Akech, 2017; Benade, 2017). Intentionally including this variable allowed the researchers to assess whether reading interventions should also consider classroom space in addition to a focus on reading instruction.

Further to this, the study assessed the impact of access to water and sanitation on pupils' attendance. This consideration was based on research indicating that the availability of water and sanitary facilities affects the consistent attendance of pupils, particularly girls, in schools (Lomborg, 2009; Jamison, et al., 2006; Agenor, 2013; Selendy, 2019). Inconsistent school attendance hinders a pupil's ability to master the reading procedure. This failure is lineal and requires that pupils and teachers follow the script unless remedial classes are arranged to help absent pupils follow through and catch up with the instruction procedure. Therefore, in this study, the school resource variable was defined by the vector of factors that show how well-resourced the school is and that have been supported in other studies to influence pupils' ability to read or learn in general.

2.3 Study conceptual framework description

Reading is a multifaceted process, and the study acknowledges that the acquisition of reading skills is also multifaceted. Consequently, no single factor can adequately explain how learning reading happens. Therefore, the study concept is informed and explained iteratively while unpacking critical concepts at each factor that contributes

to pupils' ability to acquire reading skills. The key concepts that informed the study include the following: nutrition, pupil factors, household factors to which the pupil is exposed, variations in the level of school resources endowment at each school where the pupils are enrolled, and home factors that enable continued reading instruction support and non-classroom based. The following concept describes the relationships between each factor's key elements and how they explain the ability of pupils to acquire reading skills.

Before explaining these factors in detail, the study acknowledges a particular language's central role in reading acquisition, particularly for pupils in early grades. The study also appreciates the impact of the parental level of education in offering off-school support in terms of reading practices, home reading instruction, and learning in general. Nevertheless, the study assumes that these factors are homogenous. This was done because all of the pupils who participated in the study and took the reading assessment tests speak the same mother tongue, Ciyao. In addition, preliminary data from the nutrition study in which the parents of the selected pupils participated show that there is no meaningful variation in the level of their education, preventing a meaningful assessment of how parental education affects pupils' ability to learn to read. Therefore, the study concept was restricted to factors with potential non-homogeneity in order to facilitate assessment and draw conclusions based on the above-mentioned substantial differences among the factors.

2.3.1 Relationship between pupils' nutritional status and their ability to acquire reading skills.

In the study, the relationship between nutrition and the acquisition of reading skills was influenced by two factors: (1) the number of daily meals taken by a pupil and (2) the intensity of nutrition received during the first thirty-six (36) months of life. While the study did not collect the nutritional composition of the food consumed by pupils taking the reading test, there is a general understanding and a correlation between food consumption and the nutrition status of pupils. On the one hand, it is commonly understood that pupils who are deprived of food during their growth will be stunted and malnourished. Therefore, they will not reach their full cognitive potential, which will hinder their ability to acquire reading skills.

On the other hand, the concept of nutrition states that early malnutrition is irreparable and that, regardless of future investment and consumption of nutritious food after thirty-six (36) months, there is almost no effect on the nutrition status of the pupils. This led to the study's conclusion that pre-thirty-six (36) months children who received better intensity of nutrition supplements are more likely to acquire reading skills at a faster rate. In essence, this indicates that there is a high likelihood that a positive correlation exists between improved nutritional status and improved reading ability acquisition. Therefore, the reading skills in this study are proxied by the pupils' reading fluency as measured by the reading assessment in which the pupils participated, levelled for an equivalent of two years of primary education.

Further to the preceding, it is also understood that the nutritional status of children has a direct effect on their head circumference (Peterson, 2006) and height (Mukudi, 2003). Therefore, this concept informed the study's conclusion that a pupil with better nutrition would read better than those with poor nutrition, as determined by the pupil's height and head circumference during the post-nutrition intervention that the pupils participated in during their early years. Similarly, a better-nourished child will not be stunted; therefore, the pupils' height will also serve as a proxy for nutrition following the early grade nutrition supplementation intervention in which the pupils participated at varying intensities. Therefore, the study predicts that pupils who meet the standard height for age will read better than those who fall short.

Figure 1 depicts the nutrition-reading fluency concept described in the preceding paragraphs.

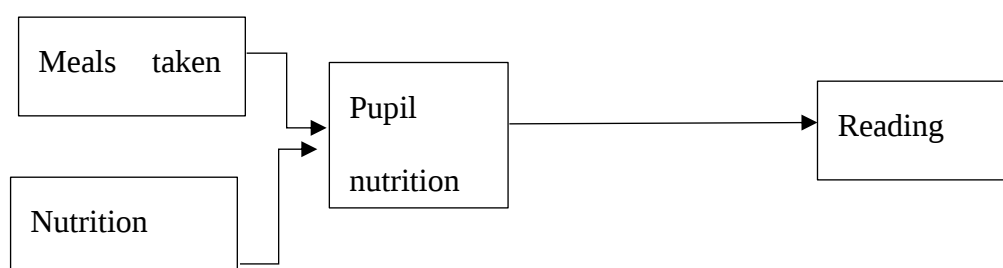


Figure 1: Nutrition effect on reading skill acquisition

2.3.2 The relationship between phonics instruction and pupils' ability to acquire reading skills

In addition to the previously described concepts of good nutrition, cognitive development, and better reading skill acquisition, the primary focus of the study is reading skills acquisition. The study is based on phonics reading instruction provided to all pupils registered in standards 1 through 4 of Malawi's public primary education. The phonics-based approach assumes a linear approach to teaching reading instruction. This approach requires that the pupil masters naming the letters of the alphabet first. Once this is thoroughly internalised and the pupil can successfully name the letters that are pointed to him or her at random, the pupil is introduced to how the letters sound. Teachers provide pupils with the sounds of the letters to learn and practise until they are able to use the sounds to predict words in a sentence. Once the pupils are able to sound the letters, they are introduced to letter blending, which is essentially the level at which the pupils are able to make syllables, read the syllables, and further blend the syllables into simple words that they read aloud with the assistance of the teachers and relate to their environment.

Thereafter, with increased time allocated to practising the words, the pupils build a vocabulary that they use in sighting words in paragraphs and can be tested for reading fluency – the rate at which a pupil is able to read, typically measured by the number of words that a pupil is able to read in one minute. Once the pupil has achieved fluency and has been certified as a fluent reader, they are gradually introduced to reading comprehension strategies they will use when reading passages and answering questions based on the reading. Reading comprehension tests are also timed for three to five minutes to benchmark a pupil's comprehension of a levelled subject. Where the pupil can read but cannot answer the questions within the allotted time, an additional period is provided so that the pupil has more time to practice reading comprehension.

The concept asserts that pupils who can progress through the processes and master each one before moving on to the next develop superior reading skills than those who do not. In other words, the study hypothesises that pupils with better prereading skills (letter naming, letter sounds, syllable reading) will achieve higher scores on a reading test measuring familiar word reading and oral reading fluency. The study also posits that pupils with higher reading fluency scores have a greater chance of reading with comprehension. Therefore, the reading test assumes that only pupils who can read familiar words fluently will move on to take the reading comprehension test. All the aforementioned propositions form the basis of the present study regarding understanding the phonics-based instruction approach. Figure 2 presents the diagrammatic illustration of the reading phonics instruction approach.

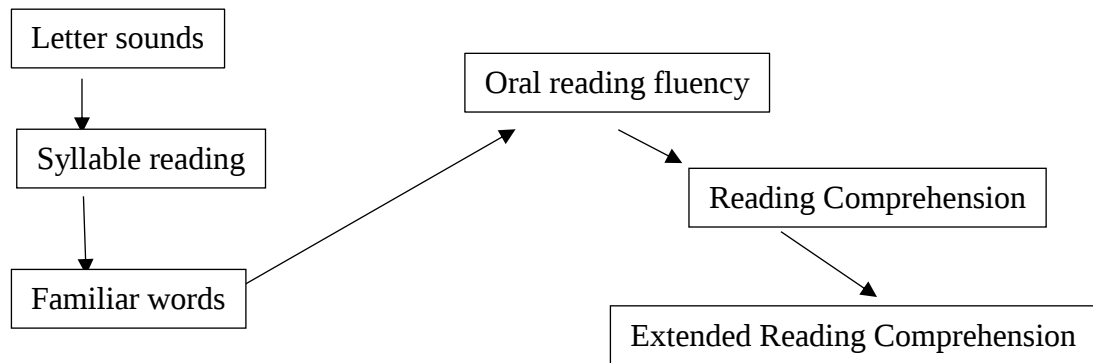


Figure 2: Phonics approach effect on acquisition of reading fluency and comprehension

2.3.3 Pupil factors that affect individual access to reading skills

The study is also informed by the fact that individual pupil differences and the support system each receives towards reading will determine how that pupil gains and maintains reading skills. In light of the fact that pupils' characteristics affect their ability to read, this study investigated the impact that individuals and home-based reading practice have on pupils' ability to learn to read. The hypothesis of this study is that the number of times a pupil is read to at home is directly proportional to the personality of the individuals who are available in the pupil's home after school to offer reading practice support. It is also associated with the number of times a pupil practises reading at home. It further elaborates on the availability of reading materials in the pupil's household.

Clearly, the frequency with which a pupil is read to at home, the frequency with which he or she practises reading, and the availability of reading materials are all related to how well a pupil acquires reading skills and becomes fluent. Therefore, the most important effect is who is available at home to ensure that pupils practise reading; they are read to and have access to reading materials to improve their reading skills and maintain the gains they would have made in school. These factors are not equally accessible to all pupils; they vary from household to household and school to school; therefore, there will be variation in how they influence pupils' ability to acquire and maintain reading skills.

At this level, the premise is that students with better access to reading materials and reading support at home will acquire more reading skills and achieve high scores on any test of reading fluency. This is a proposition that this study tested by administering a reading test over two years of primary school to a sample of pupils who participated in the nutrition intervention in their early years. The pupil's specific and individual characteristics will be collected concurrently with the administration of the reading test during the primary data collection.

In addition to the concepts described above, this study will assess the impact of regular school attendance and participation on pupils' ability to acquire reading fluency. Nonetheless, the study will be well-informed regarding the repercussions that prevent regular school attendance. These factors will include pupil morbidity and school-based bullying. Therefore, the concept proposes that pupil morbidity and pupil bullying negatively impact pupils' ability to attend and participate in reading lessons. As a result,

the pupils miss out on a portion of the structured and scripted lessons, resulting in an inability to grasp certain reading principles and a lag behind other pupils who can attend lessons consistently. This results in disparities in pupils reading test results.

The study will therefore evaluate this conceptual relationship in order to comprehend the interplay that arises from such relationships and how this aligns with curriculum developers and reading programme implementers in terms of investment priorities and classroom participation. In addition, it facilitates consistent reading curriculum coverage and the acquisition of reading skills by students. Figure 3 illustrates the conceptual relationship between the experimental variables and the explanatory variables (reading fluency).

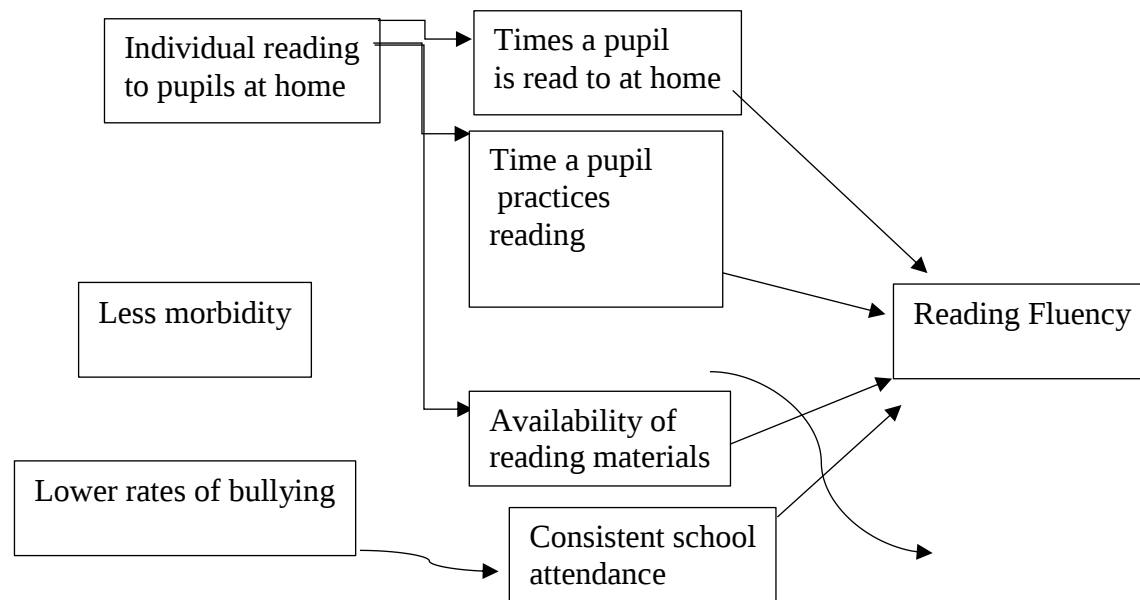


Figure 3: Pupil factors that affect their ability to learn reading

2.3.3 Inferred impact of school resources on the ability of pupils to acquire reading skills

The present study is conceptually informed by the effect that school resource endowment has on pupils' ability to acquire reading skills, in addition to the concepts that explain how pupils acquire reading skills as described above. The study reported the impact that a school with leadership that assists teachers with reading has on student achievement. Specifically, Continuous Professional Development (CPD) for teachers positively affects the quality of reading instruction that teachers are expected to provide, allowing them to instruct pupils on how to read well and ultimately improve their reading scores on standardised tests. The concept presented here assumes that schools with superior instructional leadership will have pupils with higher reading test scores than schools with inferior leadership. In addition, the study assumes that a friendly environment nurtures a learning attitude. Therefore, it is expected that schools that have teachers who are friendly with their pupils will have academically successful students. The pupils can seek remediation and improve in challenging areas of the learning process.

Therefore, this study is also informed by this conceptual position that friendly teachers make learning environments appealing; they create space for pupils to interact freely with peers and teachers, thereby facilitating remedial learning and improving learning outcomes. In this regard, this study hypothesises that pupils who have teachers who support the reading process will score high on reading tests and acquire reading skills more quickly than those who attend schools that do not provide conducive environments for interaction during the learning process.

Furthermore, the study is based on the premise that schools with adequate physical and human resources, such as classrooms and teachers, will produce better readers than schools without such resources. Another position is that schools with functional school libraries will have pupils who utilise the library resources and as a result, will have pupils who learn to read earlier than those who attend schools without library resources. In the study context, a library is a physical structure containing relevant and appropriate books that teachers and pupils can access or any storage facility containing books, references, and other learning materials that pupils and teachers can access and borrow for use after classes.

Another dimension informing the study is that schools that allow pupils to take reading textbooks home for after-school reading practice have better reading outcomes. In other respects, these pupils are better readers than those who do not have access to reading materials after school. The different dimension is that pupils at affluent schools have the capacity to acquire reading skills and are more likely to be proficient readers.

The above perspective is applicable to how pupils approach reading instruction. In Malawi, for instance, the phonics-based reading approach has a scripted instruction routine in which the pupil is introduced to the study concept by ensuring that they are all aware of the story's setting and context. The pupils are then taught fundamental prereading skills, such as letter sounds and letter names, decode the keywords in the lesson's subject text, and continue to practice reading. While the teacher demonstrates reading instruction routines to the pupils, the pupils follow the teacher's instructions. The pupils are then left to independently demonstrate what they have just learned. The routines are practised in classrooms where the teacher is expected to move around the

classroom assessing pupils facing learning challenges in order to provide immediate remediation. This becomes difficult in overcrowded classrooms where the teacher lacks space to move around and assess whether or not learning is taking place. In addition, the number of students in a classroom affects the number of pupils that a teacher can effectively guide through the phonics routines.

Therefore, the study assessed the posit that in classrooms with fewer pupils and a lower pupil-to-teacher ratio, pupils acquire reading skills earlier and faster, as measured by their reading test scores. Furthermore, the study posited that pupils who are unable to enrol in schools or classrooms with a lower teacher-student ratio struggle to access reading skills at the same level as their peers.

In the above conceptual positions, the common denominator is that each factor can influence how a pupil acquires reading skills, as measured by the reading fluency scores that a pupil achieves after taking a reading test.

However, the study investigated the combined effect of all these factors. It identified the most significant factors that clearly explain and demonstrate a greater impact on how pupils learn to read. This is a meaningful explanation of the concept, as none of the factors operates in isolation; they all contribute to the reading scores. However, these significant contributions will guide curriculum developers and implementation agents in determining the level of investments and implementation effort devoted to individual factors. Figure 4, below depicts the conceptual framework for the implied effects of the school resources School leadership supports reading CPD for teachers.

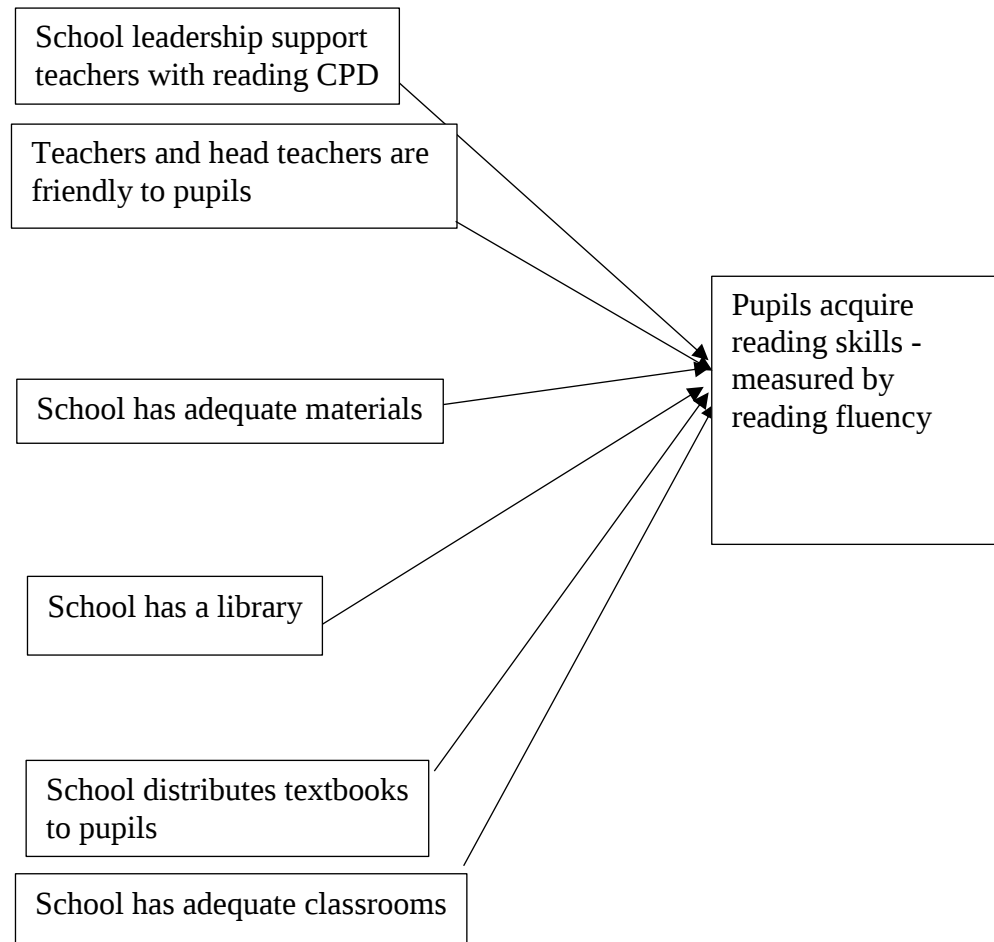


Figure 4: Implied effect of school resources on the ability of pupils to acquire reading skill

2.4 The conceptual study framework on pupils' ability to learn to read

From the preceding, it is evident that specific factors at each level of analysis determined what is crucial for explaining how pupils learn to read. Furthermore, these factors provided alternatives for what reading curriculum developers and implementers must prioritise when designing and implementing reading interventions regardless of instructional approach. Therefore, the conceptual framework informing this study posits that the nutritional status of pupils enrolled in schools influences the cognitive development that a pupil is expected to employ when learning to read. Furthermore, this nutrition status is crucially important early in life, as it is rarely corrected later in life.

In addition, the effect extends to the characteristics of individual pupils, which depend on exposure to a number of factors, including the resources available in schools to support teaching and learning, the resources that households have and expose the pupils to their continued learning efforts after school, and the ability to access reading instruction after school. These factors form shells and vectors within which specific factors under each vector are evaluated in order to narrow down the effect to individual factors that can independently and significantly explain variations in pupils' reading fluency scores when the factors are not homogenous. Therefore, the study will benefit from these specific factors under each variable vector in order to model issues and key factors that can assist pupils in reading more effectively than they do currently. These factors, once proven, will explain what needs to be done to improve further the ability of pupils to learn to read. Figure 5 illustrates the relationship between nutrition, pupil factors, school endowment, household factors, and access to after-school reading instruction and the ability of pupils to learn to read, as well as the manner in which

reading interventions must focus investment and effort on these factors to improve learning outcomes.

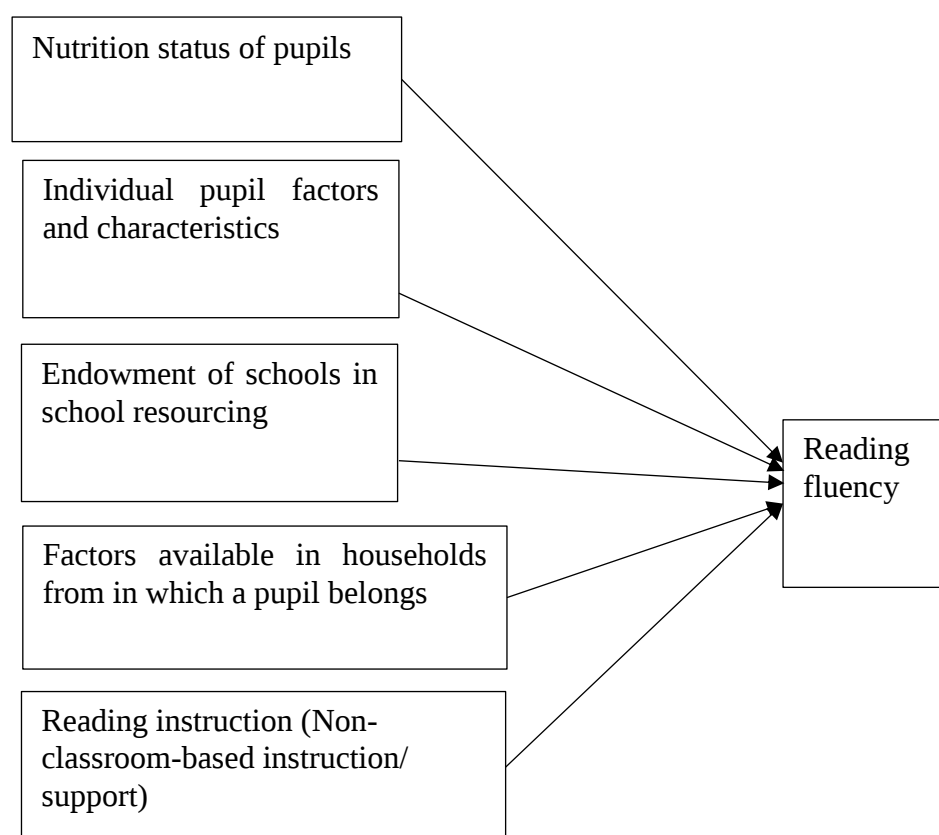


Figure 5: Key factors that contribute to the ability of pupils to acquire early reading skills

Notably, the study's conceptual framework indicates that a vector of factors affects a pupil's ability to acquire reading skills. It posits that there is no single factor that can explain why some pupils read better than others. The framework also informs the study that reading instruction is important, but not the only factor to consider. Complementary factors, such as a pupil's nutritional status, influence the pupil's cognitive ability, thereby contributing directly to the possibility that well-nourished pupils will be better readers than stunted pupils. In addition, it is well-established that the number of academic resources a school has determines the academic engagement

of its students (Llomo & Mlavi, 2016). Therefore, unpacking the resource endowment vector to assess the unique resources available has the potential to reveal resource factors that will necessitate effort from the designer and implementer of a reading intervention if more pupils are to read better as a result of such investments.

In addition, exposure to individual factors that define a pupil in their own right also explains the variation between and among pupils' scores on a reading test. Therefore, studying such variation provides a learning space that will inform the packaging of factors consistent and pronounced at the individual level to help explain performance and investments in reading, as well as a foundation for explaining why pupils in Malawi continue to underperform despite the changes in reading instruction, and investments intended to improve their reading abilities.

At the household level, a vector of factors that conceptually guide the study was also included. This remained a fact because the support a pupil receives at home after school instruction and the availability of textbooks and readers with a variety of titles have the potential to assist pupils in achieving a high score on reading tests. This performance is likely to be higher than that of students who do not have access to similar resources, which, if proven in this study, will support the argument that attention to the endowment of the household with primary readers and reading titles, as well as after-school instruction support, among others, has the potential to significantly improve the reading performance of pupils enrolled in primary schools. Therefore, curriculum developers and teacher trainers should emphasise the need to look beyond reading instruction when developing and implementing teaching reading interventions.

Similar concept on the vector of factors that differentiate how one pupil scores on the reading test from another also includes the various resources available to a school; therefore, factors that explain such a variation significantly motivate better reading test scores. Therefore, this requires that attention should be placed on these factors to explain the reasons behind lacklustre reading performance by pupils regardless of investments in teachers and teaching content, and instruction delivery fidelity that is overemphasised in both design and implementation of reading programmes.

2.5 Conclusion

In conclusion, the study concept was informed by a vector of factors that, in addition to reading instruction supports pupils' ability to read. These factors included individual pupil differences, school resources, and home-based reading assistance. Therefore, the concept explores the complementary factors that supplement reading instruction by explaining the variation that pupils experience in their ability to learn to read and their reading performance.

CHAPTER THREE

LITERATURE REVIEW

3.1 Chapter Overview

This chapter presents the literature review as a basis for accounting and understanding the implementation of effective early reading. The review will focus on the theoretical framework that provides evidence on elements that successfully teach pupils how to read, with a particular emphasis on those enrolled in early grades of primary school from a theoretical perspective and other contextual tenets that complement the success of theory-based reading curricula. Following the discussion of reading theory is a conceptual review of studies that have addressed the elements that complement the teaching of reading in addition to reading instruction theories. The literature review on these elements will provide the context necessary for optimal reading intervention delivery. Gaps in literature and practice will inform areas requiring further inquiry and shape the body of literature for this study and future studies.

3.2 Genesis of focus on the teaching of reading to pupils in early grades

Better reading comprehension skills were strongly associated with decoding letters (Cole, et al., 2018). Decoding letters and syllables was a crucial focus of teaching reading through the phonics-based approach, where phonemes were used to decipher syllables and words.

The role of phonics was essential and is currently emphasised in reading theories. This was the most important factor in developing readers with fluency and comprehension skills at an early age, particularly when teaching reading leverages a language familiar to the pupils (Elwér, 2014).

Other important factors that contributed to better reading skills included direct decoding, comprehension, and literature appreciation. Significantly essential to sustaining reading gains are phoneme awareness instruction, systematic and explicit instruction in the code system of written languages, daily exposure to a variety of texts, and pupil-independent reading. For comprehension, a variety of complementary methods are designed to explore the relationships between words and the relationships among word structure, origin, and meaning, and it was essential to predict outcomes. Otherwise, extensive comprehension is enhanced by summarising, clarifying, asking questions, visualising, and frequently writing in prose (Moats, 1999). Mastering reading skills in early grades was key to developing comprehension skills for learning, mainly when semantic mapping and morphological analysis are incorporated into the teaching curriculum (Alakawi, 2017). In addition, teaching instruction that utilised diverse text structures was more pertinent for accelerating the acquisition of reading skills (Hamameh, 2018; Lei, 2019).

The above notwithstanding, other scholars identified context as a critical aspect for teaching reading strategies (Bretton, 2018), arguing that, in addition to teaching instruction and the design of reading interventions, implementation context impacts pupils' ability. While agreeing with the aforementioned approaches, some scholars

noted the need to go beyond the teaching of reading and encourage children to value reading for pleasure, as this positively impacted the cognitive development of children and improved academic outcomes (Whitney, 2018). Others also projected the role of parents in teaching reading, in particular, a positive correlation to reading comprehension and storytelling (Wehbe, 2014). This finding indicated that teaching reading is a complex endeavour whose success depends on a variety of factors.

Benade (2017), Freeman (2004) and Langer (2013) have focussed on reading instruction curricula, teaching, and development of reading materials as core elements in designing an effective reading intervention. This position has some merit in the sense that there has to be an interaction between the pupil, text, and guidance from the teachers to commission pupils to decode words. However, there are complementary factors, such as the role of parents in storytelling and inculcating a reading-for-pleasure culture in their children, also recognised as the origin of affective reading that cannot be downgraded in the process of teaching reading. The same holds true for access to supplementary reading materials within homes as a critical factor in assisting pupils with reading practice. Therefore, teaching reading requires an interplay between reading instruction, the quality of teachers and texts, and routine reading practice guided by proficient readers in the environment in which pupils live. The implication is that the development of reading interventions that do not consider the context in which reading instruction is delivered has the potential to perform sub-optimally for lack of integration of complementary contextual factors. These factors are mentioned above and will be discussed in detail in the sections that follow.

3.3 Theories on reading instruction

According to studies, reading instruction theories have not been proven or disproven. However, they explain how they have influenced reading instruction (Robinson, 2018). Dominant among the theories are Behaviorism, Cognitivism, Constructivism, and Transactionalism. The review will evaluate each theory separately and assess the relevance of such approaches and their impact on the development of reading skills for pupils in Malawi. This will include the rationale for implementing the phonics-based approach under which the reading assessment has been administered.

3.3.1 Behaviourist Theory on learning

According to the behaviourist theory of reading, learning is the result of a stimulus, a response and the association between the two. It proposes that learning changes result from the form and frequency of the visual performance by the learner (Ertmer, 2013). The theory assumes that learners are responsive to a stimulus and that reinforcement increases the likelihood of a similar response in the future. Practically, the performance based on this theory depends more on consistent practising and less on memorisation by the learners. This theory places the teacher at the centre, with the teacher dispensing knowledge to the learners based on the environment and instructing them to progress from simple to complex tasks. In other words, the teacher takes the learners from direct instruction and gradually supports them to master the skill and knowledge through repeated reading practice and instructional routines.

The behaviourist theory, as described above, reaffirms earlier claims that pupils learn a language from practising teachers' routines. However, this is contingent upon the response to the specific environment. For example, positive reinforcement of learned

language results in sound repetitions, implying that pupils acquire the language through imitation (Freeman, 2004). However, the behaviourist theory of learning assumes that learners are passive participants in the process of learning; instead, the environment influences how they learn. This assumption is debatable. It is a well-known fact that children learn a language nearly simultaneously despite growing up in different environments. This fact implies that the domain is not unique to the process, suggesting that additional factors assist language acquisition. Such factors influence how fast the children adapt to the learning process rather than the child's passiveness as proposed by behaviourist theories.

Akech (2017); Adamba (2018), and Afoakwah and Koomson (2021) have pointed out how the environment influences and inspires learning as a concern, stating that the environmental influence is not a universal occurrence; rather, it varies among individuals who are exposed to a particular aspect of the environment. Similar circumstances are eminent in the assumption that there will be a structured adherence to fine-grained instruction that supports remediation from the repeated practice that this theory posits. However, this is uncommon because teachers and others who support the learning process are skilled differently (Fox, 2004). Therefore, the behaviours that support the learning process would vary regardless of the strict scripting of instruction. Consequently, the learning outcomes of pupils subjected to the delivery of reading instruction are likely to vary and cannot be standard.

Earlier critics of behaviourism have also questioned the assumption that the reading curriculum can script teachers successfully and have them view learners as passive actors in the learning process (Goodman, 1979). Essentially, this assertion considers teachers as inactive in the delivery of instruction, which is contestable since teachers have background knowledge, will always apply it in their teaching routines and may consider conceptual expertise that learners bring along. Others, however, have supported that learning can occur naturally, even without prior knowledge and instruction from teachers, parents, and peers. Such learning makes use of available text, investigation of the text, and efforts to make sense of regularities in a text (Teale, 1982), thus supporting other elements on how learning occurs and the pupils' behaviour. Therefore, behaviourism as a theory cannot fully explain how learning takes place. The aforementioned factors complement other learning theories for optimal reading results in pupils.

The tenets of behaviourism are prominent in the teaching of reading through a phonics-based approach. These tenets are present in the procedural nature of the phonics approach to reading instruction which is, in essence, a bottom-up approach. The bottom-up approach to phonics begins with simple reading tasks and progresses to more complex ones. For example, pupils first name the letters of the alphabet through the teachers' repeated instruction. Second, teachers teach the sounds of the letters, where the teacher models the letter sounds. Thirdly, the teacher says the letter with the pupils, and fourthly, the pupils repeat the sounds by imitating the teacher's pronunciation. Lastly, the pupils are taught letter blends, from simple to complex syllables. Once the pupils internalise the routines, the teacher introduces nonsense words and familiar words before introducing the pupils to short phrases. When pupils

can read nonsensical words and phrases, the teachers introduce pupils to short paragraphs and practise reading fluency with the pupils. After that, the teachers work with the pupils, to teach them comprehension strategies they have to use to make meaning of the words read in the paragraphs. These are practised repeatedly and assessed based on the number of correct responses from listening to a paragraph being read aloud to the pupils and self-reading (listening and reading comprehension, respectively).

The routines in the reading described above are scripted to ensure implementation fidelity. Teachers are encouraged to rehearse and repeat routine behaviours until the learners internalise the process and can read independently. Notably, this approach involves a series of procedures whose successful implementation depends on the teachers' implementation fidelity. Unfortunately, the implementation of teaching fidelity is not universally uniform (Stockard, 2020). It is also a teacher-centred approach. According to previous research, the success of teachers requires a strict adherence to time on task, which is difficult to attain in overcrowded classrooms, (Küçükler & Kodal, 2019). Therefore, the phonics approach to teaching reading may be theoretically sound for instructional design.

Nevertheless, phonics relies on certain assumptions in order to be effective. For example, the instructional approach alone does not guarantee that pupils will learn reading better; the environment in which the teacher implements the approach must be conducive to the assumptions and doctrines of the approach. These include a low pupil-

to-teacher ratio, consistent school attendance by pupils, and learning support provided to pupils after school for continued learning.

3.3.2 Cognitivism as a theory of reading

The Cognitivist theory departs from the behavioural theorist's earlier assertion that learning is a response to a stimulus. Instead, the Cognitivist theorists contended that there were more to learning than responding to a stimulus. The pupils' background knowledge and internal and active mental processes contribute to the development of their ability to learn (McLeod, 2003). An extension to this understanding postulates that cognitivism has a basis in the mind and how it processes and stores information.

Further, the theory states that learning entails reflecting on the presented phenomenon, remembering what has been learned, perceiving and interpreting content, and reasoning and solving problems. This learning process begins with what the pupil already knows. The general knowledge of the operating environment informs both the content and manner in which pupils use it to understand new information (Clark, 2018). Guney and Al (2012) stated that cognitivism thrives in the learning environment. They stated that pupils should be allowed to independently explore, manipulate, experiment, question, and seek answers. Therefore, schools should foster an exploratory environment in which learners can interact. This former assertion shifts responsibility to the pupil and suggests that the pupil should not rely excessively on the teachers' instructions. It also requires the provision of learning spaces and encourages the interaction of pupils with their learning environment.

It is evident that Cognitive theory depends on the pupil as an active learning unit. However, without undermining the ability to self-learn based on experiences, the theory appeals to pupils who have mastered basic learning skills and are transitioning to mastery of skills, content, and mental capabilities. It will work well if the pupil is proficient in the language of learning. With such mastery of language fluency and reading ability, pupils can apply foundational knowledge, critical thinking, problem-solving, and reasoning if allowed the independence and nurtured to work independently while using concepts in their work environment. However, this learning theory is challengeable if applied wholesomely in teaching early reading. It will require pupils to associate what they observe in their environment with available text. This requirement becomes even more challenging for those learning to read in a second language. This challenge exists because second-language learners will not immediately recognise the objects, items, concepts, and knowledge they observe. Therefore, the association of text to the objects, concepts, and other things that learners are familiar with in their environment will not be direct, making it challenging for the learners to decode the text. A similar misalignment will occur between memory concepts and names of objects in one language and the second language at the time of transition. The cognitivism theory of learning places the school at the centre of the creation of a resource-intensive environment for responsive self-learning. Therefore, this theory may not be applicable or effective in under-resourced learning settings, where only the teacher facilitates learning and where pupils' homes cannot offer peer learning support or parental support.

The implementation challenge with the cognitive theory of learning mentioned above is ideal for high-order skill learning where parroting and repetition do not result in expected performance. While the cognitivist theory approach relies on pupils' memory to recall what they learned and process information to solve problems, it subjects itself to rote memorisation, which also risks reasoning capacity. All the pupil has to do is recall and regurgitate content. In addition, cognitive theory's notion of schemata, being the backbone of instruction design, restricts learners' knowledge and conceptual application to what they know. This notion may disincentivise the effort to learn concepts about other environments and incrementally build more schemas in line with the globalized knowledge required for learners to adapt and compete universally. Therefore, this theory can create a knowledge deficit where the application is restricted to the known environment and restricted for acquisition as a learned concept based on interactions with new content.

The schematic doctrines evident and forming the base of the cognitive theory were heavily influenced by the whole-word approach to reading instruction (Jackendoff, & Audring, 2016). In this approach to reading, Instruction Designers use pictures of commonly found objects and concepts in the environment where the reading instruction will occur, with the understanding that the reading curricula developers are well versed with the environmental context in which the content is delivered. The rationale for using familiar images, concepts, and other things is that the pupils know the physiology of the items depicted in the pictures, concepts, and objects enough to name them in their local language. The teachers afterwards rely on the pupils' ability to read text attached to the pictures, concepts, or objects. While this may work out as the children have enough schema about the images in the photos, they mostly use the schema to

front their reading fluency and find it difficult to read words in the text when presented to them without the said text. This strategy does not invest effort in letter formation and blending to create words. It depends on the assumption that pupils will read the words as sighted based on a familiar schema. Therefore, the whole word approach promotes reading words limited to the pupil's environment and language. It restricts the decoding of the letters for pupils to read fluently and independently of the aforementioned presumptive schema.

Therefore, the discussion of this theory highlights the significance of the environment in reading instruction. This discussion emphasises that regardless of the teaching of reading through a structured and mechanical process embedded in the phonics-based approach that has informed the National Reading Programme in Malawi – which is the unit of study on the performance of pupils in reading under the study- the context of the pupils matters and affects how well they read individually. As such, it raises the potential that the reading instruction should consider the underlying context of each pupil and their schema when instructing them to decode and follow the processes that the phonics approach avail.

3.3.3 Constructivism Theory

Constructivism refers to theories of knowledge and learning. These theories asserted that knowledge was constructed as opposed to originating from an objective world or external reality. For example, knowledge does not exist in a book; rather, the reader creates it through the act of reading (Lowenthal & Muth, 2008). Others (Carlson, 1999), have previously explained that Constructivism focuses on the pupil; the reading process is meaning-based, interactive, and responsive to the pupils' needs and interests.

Constructivism is better understood through the attribution of learning reading to pupils' prior experiences, the pupil's processing of new knowledge, and the scaffolding provided by teachers to facilitate learning of reading with understanding in a less prescriptive and non-routine manner. Additionally, the theory of constructivism integrates language and literacy. It finds the prescribed curricula and scripted reading instruction to be dehumanising and gives materials more power than human interaction (Tunmer, Greaney, & Prochnow, 2015).

Typically, Constructivism acknowledges that pupils constructed new knowledge when they interacted with others or the objects in their surroundings. This interaction activated existing background knowledge in response to interactions, built new knowledge from prior and existing knowledge, or converted older information into new knowledge (Alvermann, et al., 2019). The basis for constructivism theory seems to closely relate to social interaction approaches to the teaching of reading. The pupil's schema is the basis from which constructivists develop new content and allow further reader interactions to build new knowledge and add to the developing schema. The new information introduced to the pupil builds on the supposedly existing reflections in the pupil's environment. The emphasis on interactions by the pupil contributes to the development of pupils' understanding and interpretation of the literature that they are exposed to. In constructivist reading theory, it is evident that meaning-making becomes a central thesis that the teachers and pupils pursue in teaching and learning to read. In addition, the construct theory applies to comprehension strategies, a higher-order skill in reading progression expected of the pupils.

The theory assumes the universality of schema to the pupils learning to read using this approach. This assumption calls into question the validity of the theory in diverse societies, particularly if it is applied globally to a national curriculum in which pupils have diverse schemas. It is challenging to find reading materials that appeal to such a diverse audience. Therefore, the theory cannot be widely applied to reading instruction in national curricula. It develops in pupils who are already intermediate readers and is probably not as useful in teaching reading skills to beginning readers. However, the theory is more relevant to applications in reading comprehension strategies. Other theories and approaches to reading instruction, such as cognitivism and behavioural approaches, should be integrated so that the pupils acquire fundamental decoding skills before transitioning to comprehension strategies. This is a position where a thin differentiation of reading skills and strategies occurs; reading skill is more relevant to text decoding, word making, formations, and paragraph fluency. In contrast, the reading strategies pertain to comprehension strategies where word meaning was of critical significance and served as the basis for learning (Manoli & Papadopoulou, 2012).

3.3.4 Transactionalism theory of reading

Transactional theorists on reading stipulated that individuals internalised language through interaction (transaction) with a particular environment. They argued that despite shared lexical concepts being a common factor in language to make meaning with others, room for individual differences was considered significant. Personal experiences served as a basis for making meaning of what one reads. The defining characteristic of transactional reading was that "meaning" does not preexist in the text or the reader but rather emerges during the transaction between reader and text (Forster

& Rosenblatt, 1998). Examining this presentation of the transactional theory has revealed the interplay between text, reading skills, and schema, thus supporting the transactional theory's contention that both the reader and the text play essential roles in the formation of meaning. Meaning is generated through an ongoing transaction between the reader and the text, utilising the text's semantic potential and the readers' experiential reservoir (Marhaeni, 2016). While applauding the role of interaction in the teaching of reading, earlier experiments with the theory of transactional reading highlighted the role a teacher or third party in making meaning of what one is reading and building a vocabulary for reading. Such studies have underscored the role of reading text aloud to pupils and the interaction that follows as an added benefit to readers' progress in comprehending what they read. These 'read-alouds' were found to be complementary to the reading process when viewed through a transactional lens. In essence, arguing that, schema, and interaction of the two by a reader, third-party support in vocabulary building increases the ability of the reader to comprehend (Greene & Lynch-Brown, 2002). The premise of transactional theory thrived on the basis that everyone in the universe affects or was affected by another (Sameroff, 2009). Without questioning or challenging other reading theories, transactional theorists emphasised the interaction between pupils during the reading process.

In addition, transaction theorists concentrated on how the reader used the schema that he or she already possessed, as well as how the text was constructed to facilitate interaction in reading for individual meanings. Transactional theorists concurred with the aforementioned positions that reading was not a complex process based on linear information. Instead, they supported the view that the reader's situation and past

experiences influence meaning-making, prior knowledge, and the text; therefore, this was a more inherently uncertain process (Gourlay, 2003).

In most respects, the transaction theory of reading is a high-end reading process that is more suitable for explaining reading comprehension strategies. This assertion is apparent in its assumptions based on the schema, prior experiences, and the text. The theory does not explain how a pupil would initially learn to read prior to interacting with the text. Instead, it assumes that the reader possesses basic reading skills to use in interacting with the text. In addition, the theory does not explain how text authors use the context in which they write to ensure a global understanding of the context. This lack of clarification is problematic. The text is curriculum-based and expansive across multiple contexts based on the environment of pupils who are expected to access the reading curriculum with similar prior knowledge. Where this is not possible, the theory posits that each reader will bring meaning to the text based on his or her individual schema and previous experiences, extending the theory's applicability to literal contexts where meaning-making can be individualised. This position is extremely difficult when the text's objective requires similar meaning-making, and even more so in objective knowledge-making. The application of the theory is also challenged by curricula that require readers to construct global meanings.

3.4 Review of the reading approaches used in the design of the Malawi national reading programme

The Malawi National Reading Programme was developed out of a National Reading Strategy whose approach transcends multiple reading theories. The programme was developed based on the realisation that pupils were previously exposed to fewer words following a whole reading approach that was the basis of the reading curriculum (Malawi Government, 2015). The strategy focuses on the social interaction theory of reading. The theory premises that pupils learn to read in a second language more effectively if they have mastered the concepts in a familiar language. The approach aims to influence cognitive development and holds that there is no loss of time in learning a second language if students have already mastered the concepts in their first language (Grabe & Zhang, 2016). Social interaction is dominant in the textbooks' design and instruction language. In each of these cases, the approach ensured that children were familiar with concepts in their local language before introducing vocabulary in the second language. The purpose of this practice was to increase the likelihood that pupils will understand concepts before decoding and deconstructing the words behind the concept in both foreign and local languages.

In addition to the social interactions reading approach in the programme that bases the Chichewa and English curricula on standards 1 through 4 for all public schools in Malawi, the approach heavily depends on how teachers instruct pupils to read. Thus, the approach centred on the pedagogy of the instructor, emphasising the interaction between the pupils and learning materials. The teacher was regarded as a critical element in teaching reading to beginning readers (Richards & Renandya, 2002). This practice is evident in the scripted phonics-based teaching procedure, which borrows

this aspect from the social interaction theory. Therefore, the curricula textbooks universally accessed by pupils enrolled in primary schools in Malawi were re-developed to align with a phonics-based approach. This approach taught routine reading practices, had pupils observe the teacher read, had the teacher read with pupils, and had pupils read independently, essentially fostering interaction between the teachers, pupils, and text.

However, this arrangement presumed that the pupils would consistently attend and participate in class, as lessons build upon one another. Therefore, knowledge of the previous lesson became paramount for the pupils to understand the new lesson in both Chichewa and English. Unfortunately, this critical assumption did not hold due to the inconsistent attendance of classes by pupils in Malawi due to illness, truancy, and a complete lack of interest (Nagarajan et al., 2017). In addition, it is evident that the large classroom size and limited time for teaching Chichewa and English in the early grades prevent teachers from offering remedial classes for absentees. Therefore, teachers proceed with the scripted lesson plans, preventing, on average, better learning performance for those who miss out on lessons due to the reading intervention's design.

Furthermore, it is notable that the transition between Chichewa and English in the reading programme is such that learners in the lower grade will be introduced to the concepts in the reading text in Chichewa, taught how to read the text, and later build vocabulary in English. This routine happens before the pupils are trained to decode the letters, words, and text. This attempt integrates the cognitive view theory as explained previously. The teachers present the background knowledge of the concept before interacting with the text. The programme also integrates transactional reading and metacognitive theories as defined above. The approach focused on a pupil's control and

comprehension of a reading text (Pardede, 2008; Butler-Pascoe, 2011; Dubno, 2010; Pollitt, 1993; Grantham-McGregor, 1997). This approach is also consistent with the National Reading Programme's emphasis on teaching comprehension strategies to pupils who develop fluency in reading. In addition, those without reading fluency are subjected to a school-based remediation process, which is supposed to be provided by overworked teachers but rarely occurs in schools.

From the initial review of the theories engaged in the design of the reading programme in Malawi, it is evident that there was a concentrated effort and investment in teachers' instruction to help pupils acquire reading skills in early grades. The teaching instruction employs an interaction between what is known from the social context and what the teacher teaches the students about the context. Then, the pupils are given the independence to practice reading and concepts within the text. In addition, the reading interventions include textbooks written in a second language based on concepts that are introduced to the pupils in their first language. Reading instruction in the interventions also focuses primarily on teaching reading strategies and multiple titles of supplementary reading materials in multiple languages (including the local language) to increase the availability of texts for students as a supplement to the maintenance of students' reading skill gains. However, these supplementary reading materials are deposited with implementing primary schools with the expectation that pupils will borrow the titles for independent reading, primarily after school.

Nonetheless, it has been observed that communities discourage pupils from borrowing these supplementary books from the school out of fear of incurring penalties for damages and loss. Therefore, restricting access to texts other than those found in the curriculum undermines the program's complementary assumptions. This practice further hinders the application of the reading curriculum's underlying theories. It contributes to reading loss for pupils in early grades, who lack the time and resources to regularly practice reading.

The theoretical base notwithstanding, the implementation context of the reading interventions was not adequately considered in the design of the programme. Therefore, giving room for variations in the performance of pupils on reading as individual pupils bring along different contexts that cannot be integrated into a singular approach to the teaching of reading. Regardless of similar efforts across the interventions, contextual factors significantly contribute to reading outcomes in the curriculum's reading instruction approach, despite the blend of theories. Therefore, designing a reading intervention based solely on reading instruction theories overlooked potential barriers to achieving better reading outcomes. These barriers include the political economy that motivates key stakeholders to perform their roles as expected, such as teachers in schools doing their work, pupils attending classes regularly and timely, and headteachers and section heads providing classroom support to teachers as well as sanctioning those who did not do their jobs. These aspects of the implementation of the programme by the teaching workforce remain crucial. In instances where School Leadership lacks the authority and necessary skills to manage the teaching workforce and attention and participation of pupils in the classroom, the

implementation fidelity of well-designed and theoretically-grounded approaches is compromised.

The Malawi reading programme is theory-based. It has, however, disregarded other factors that have a greater impact on results and performance of pupils. Therefore, it is essential to begin questioning these aspects and determining how well, if given proper consideration when programming reading outcomes, they could complement the success of getting pupils to read faster. Such factors influence reading outcomes and inform the packaging of reading components and tasks in a programme based on general practices that make learning easier and faster for pupils. This practice is also grounded in research that supports the proposition that other factors, such as household environment and nutrition status, strongly affect pupils' ability to learn well in the early years, regardless of pedagogy and its theoretical underpinnings.

3.5 Evidence of the effect of early nutrition on learning outcomes

Early studies conducted in Jamaica on the effects of early childhood supplementation with and without stimulation on the later development in stunted children revealed that the stunted children scored significantly lower on the majority of assessments than non-stunted children. In addition, stunted children's heights and head circumferences at enrolment predicted intelligence quotient at follow-up in a significant manner (Grantham-McGregor, et al., 1997). Similarly, research conducted in Guatemala on a cohort of subjects exposed to nutrition supplements prenatally and for at least the first two years of postnatal life and others who received supplementation after 24 months of age revealed consistent differences between groups on the psychoeducational tests

(Pollitt, 1996). It was further found that those who received supplementary nutrition prenatally and postnatally scored significantly higher on knowledge, numeracy, reading, and vocabulary tests than those who did not.

Further to these findings, the study concluded that nutritional differences provide the most robust explanation for the differences in test performance. However, in a survey conducted in Indonesia, Pollit, Watkins, and Husaini (1997) did not find any immediate benefits of nutritional supplementation. Instead, the benefits on the infants were observed eight years later, when their memory function was better than those who did not receive nutrition supplements earlier in their lives. Similarly, another study on supplementation attests to the longer-term benefits of nutrition supplementation, where benefits begin to manifest at five years and none are observed at 18 months in terms of variations in children's learning (John, et al., 2013). Therefore, it is more appropriate to examine the effects of early nutrition on learning outcomes after a longer period of nutrition supplementation.

The aforementioned findings suggested that longitudinal tracking of beneficiaries of early nutrition supplements should be conducted for a sufficient period of time to assess their learning performance, which may not be significant in the years immediately following nutrition supplementation. While these findings sparked interest in longitudinal studies on nutrition supplementation benefits to learning outcomes, Glewwe, Jacoby, and King (2001) were unable to establish the link between nutrition and children's learning ability. Nonetheless, they found out that better-nourished children perform significantly better in school. They cited early enrolment in school, more time to learn, and thus greater learning productivity per year of schooling as some

of the reasons. Their cost-effective analysis found that a dollar invested in early childhood nutrition potentially generated a three-dollar return of gains in academic achievement.

Similar studies conducted by Dubno (2011) in the states of Washington and Colorado, United States of America, showed that pupils with access to early nutritional and education interventions graduate from specific interventions designed to bridge their abilities to join high-performing pupil cohorts earlier. Afflerbach, McGaw and Scalapo (2008) urged researchers to begin bridging theory and practice with coherent models that support reading development. Therefore, it is critical to have reading programmes that are well-informed about nutrition status and probably mitigate poor nutrition status, which may impact pupils' learning in public schools in Malawi and elsewhere. Similarly, integrating the positive association between nutrition and learning into the planning of reading interventions and other teaching initiatives aimed at pupils in the early grades is crucial in light of the available evidence.

Studies on nutrition reviewed above largely agree on the positive correlation between early nutrition supplementation and improved learning outcomes. However, some of these studies raise the issue of timeframe, suggesting that the effect of early nutrition should be studied longitudinally and that such studies must be designed to accommodate the period. This position bodes well for one of the crucial aspects of this study, in which we track the children's performance eight years after receiving nutritional supplementation. The central focus of the study is the ability of children to read based on the intensity of nutritional supplementation intensity received during their first 18 months.

A study conducted in Malawi followed food consumption trends and nutrition adequacy during harvest and non-harvest seasons. The study collected food consumption data from rural Malawian children aged 3 to 6 years over the course of two (2) seasons using local foods that satisfied a set of nutritional constraints while minimising the total energy content of the diet. Additional restrictions on daily intakes of foods and food groups were also introduced to ensure that the diets were compatible with local food patterns. The strength of the constraints was assessed by analysing nonlinear programming sensitivity. The results revealed that satisfying nutritional recommendations with a slight departure from the local diet during the harvest season were possible. However, during the non-harvest season, nutritional adequacy was impaired due to the low availability of riboflavin- and zinc-rich animal or vegetable foods and the high phytate content of other foods. This analysis suggested that nutrition education could help improve children's diets during the harvest season. In contrast, changes in the range of available foods might be needed in the non-harvest season (Darmon, et al., 2002).

Luckett, et al., (2015) in a study conducted in Malawi between 2010 and 2012 on 11,841 households to examine food system provision variation by time, space, and socioeconomic status revealed population and spatial locations variation. Food obtained from the markets contributed more to nutritional diversity than home-produced food. Therefore, households closer to markets had better access to food and nutrition and there was less nutritional diversity during the growing season than during the harvesting season. In 2019, another study corroborated these findings, stating that in Malawi, within the lowest expenditure quintile, maize accounts for 342 g per capita

of daily food intake, or 62 percent of daily food consumption, compared to 47 percent of daily food consumption in all households. Animal-source foods, including meat (3 g per capita per day), eggs (1 g per capita per day), and fish (14 g per capita per day), are significantly missing from the diets of the poorest households. For households in the lowest expenditure quintile, per capita availability across essential nutrients is approximately 40 percent lower than all households. The only exception to this general pattern is vitamin A, whose nutrient availability is driven by the intake of leafy greens, other vegetables, and mango (Donovan & Gellib, 2019). In this case, the majority of people living in places away from markets would lack nutritional diversity. Malawi is 83 percent rural (Malawi Government, 2018), so it is highly probable that of the majority of the population will have limited access to nutrition, especially children who must rely on adults who do not have access to nutritious food throughout the year for themselves.

A third study on the composition of food consumed locally in children aged 3-6 months showed that children who consumed animal protein had better linear growth, resulting in less stunting (Kaimila, et al., 2019). Given that the majority of diets in Malawi are plant-based, stunting of children is expected and also the weight to height ratio; hence there is a high probability that children in Malawi will have fewer cognitive skills, which will impede their ability to learn if they are not well supplemented.

In Malawi, further ethnographic studies on the understanding of nutrition by parents and caregivers revealed that parents and caretakers' patterns of health-seeking behaviour for their children showed that they would seek medical attention for high fever and diarrhoea without understanding that malnutrition could be a leading cause

to such conditions. The study further revealed that parents are more concerned with their children's weight than their height. Moreover, symptoms of malnutrition, such as wasting and oedema, were regarded as the least severe childhood illness symptoms (Flax, et al., 2016). These findings suggested that a lack of knowledge of malnutrition symptoms led parents to persistently treat symptoms such as fever and diarrhoea, thus reduced their available time to engage in productive ventures for the household's well-being. It also implied that children affected by the symptoms and resulting effects were susceptible to persistent morbidity, and as a result, had less time to devote to activities such as education, child play that stimulated cognitive growth, interaction, language development, and others. As a result, interventions such as reading instruction did not incorporate complementary efforts to treat malnutrition in children.

Nevertheless, assuming that parents and caretakers will have adequate time to support children's reading efforts and that the children will actively participate in their learning misses the point. This phenomenon exists because the children and parents have insufficient time to participate in reading instruction because they must consistently treat the morbidity caused by malnutrition. In addition, the time spent caring for ill children reduces a family's ability to earn enough money to afford education expenses. Therefore, the parents of these children are less likely to invest in additional reading materials so that their children have access to more reading titles and greater exposure to text for reading practice at home. Such occurrences challenge the underlying assumptions of an intervention, such as reading instruction. Moreover, they pose obstacles that question the validity of programming assumptions. Therefore, they remain a significant challenge in developing programming that does not account for

the design and implementation mechanisms of well-thought-through theories in developing reading curricula.

Yeudall (2005) found that a significant proportion of the population in Malawi depends on high-phytate maize-based diets. This reduced the potential for dietary diversification, changes in food selection patterns, and modifications in food processing to reduce the phytate content of maize-based diets. Given the situation, the population, particularly in children, had reduced intake of protein, calcium, zinc (total and available), haem iron, vitamin B12, and animal foods (grams; % of total energy).

Several studies have also shown that vitamins and minerals are essential to humans because they play essential roles in a variety of primary metabolic pathways that support fundamental cellular functions. In particular, their involvement in energy-producing metabolism, DNA synthesis, oxygen transport, and neuronal functions make them critical for brain and muscular function which affects cognitive and psychological processes, including mental and physical fatigue. These elements include the B-vitamin family (B1, B2, B3, B5, B6, B8, B9, and B12), vitamin C, iron, magnesium, and zinc, all of which proved recognisable roles in cognitive development (Beluska-Turkan, Korczak, Hartell, Moskal, Mackonen, Alexander & Salem, 2019; Edward, 2015). Therefore, inadequate consumption of these nutrients in Malawian children who are over-fed the phytate maize diets threatens their cognitive development and learning capacity.

Therefore, cognitive-based curricula interventions must be cognizant of the dietary diversification of micronutrients through food intake, or they must be coupled with micronutrient interventions that target cognitive development and complement curricula instruction for faster, more sustainable gains in learning outcomes. It is a fallacy to assume that the population targeted by curricula interventions will have adequate access to micronutrients and the appropriate cognitive development state. Such a scenario must be adjusted based on the baseline micronutrient uptake if the intervention does not address it.

Additional research on nutrition and academic performance showed that the prevalence of nutritional stress had a significant impact on school attendance rates. Therefore, nutritional status had a predictive effect on educational achievement, particularly for girls with poor socioeconomic status. Mikudi (2003) found that twenty-nine percent of the 851 students enrolled in the five indexed schools in Kenya fell below the 90% cut-off value for acceptable relative weight for height. The percentages of the population falling below -2 standard deviations on indices for height for age and weight for age were 16.64 and 3.78, respectively. The anthropometric assessment varied by school and gender, whereas school achievement scores correlated significantly with school attendance, followed by weight for height. Another longitudinal study conducted in the context of developing countries followed the weight for height of children aged 7-8 and then assessed their competencies (self-efficacy, self-esteem, and educational aspirations) at the age of 11-12. Controlling all household and community effects, the study found that height for age predicted the observed psychosocial measures (self-efficacy, self-esteem, and educational aspirations). While there was no direct relationship between nutrition and learning in

terms of supplements, the psychometric proxy for nutrition demonstrated a positive effect on psychosocial measures associated with gains in learning (Dacon & Sanchez, 2015).

Another research on a population-based epidemiological cohort in the Japanese American community of King County, United States of America, revealed that a larger brain volume, measured by head circumference, provides a buffer against clinical symptoms of Alzheimer's disease, which lowered the risk and reduced the severity of diseases. According to additional studies, the head circumference of 1,985 older adults who underwent cognitive testing was associated with superior cognitive performance (Graves, 1996). These findings established a correlation between head circumference positively and nutritional status, and by extension, cognition and academic performance.

Having observed the nutrition status of Malawian children in general, trials of food supplementation at a young age have demonstrated an effect on the linear growth of children who were given 10–40 g/day of Lipid-based nutrient supplements. This had resulted in higher energy and macro-nutrients intakes among 9 to 10-month-old Malawian infants without displacing locally accessible Complementary Foods (Hemsworth, Kumwenda, Arimond, Maleta, Phuka, Rehman, Vosti, & Ashorn; 2016). However, such trials have not been implemented on a large scale nor have they been proven on a large scale; consequently, the benefits of food supplementation cannot be observed on a large scale. Significant reasons for not scaling up the trials include the amount of financial resources and public civility that must accompany the rollout in

order to benefit as many children as possible and improve the nutrition status of the children in Malawi. Otherwise, a more recent study found that at a median cost of \$2.26/person/day (2011 US\$ PPP), the shared diet is unavailable or unaffordable to 80% of rural Malawian households based on their current food expenditures, and to 69.5% even if all available resources were spent on food.

On the other hand, the individualised diet was more accessible – 90% of the time on average – at a lower price (\$1.79/person/day) but was unavailable or unaffordable for 62% of the rural population within current food budgets and 44% even if spending all resources on food (Schneider, Gerlad, & Friedman; 2021). These findings suggested that undernutrition was perpetual in Malawi. According to a literature review on the effect of nutrition on learning outcomes, the ensuing effects impede the success of development interventions that aim to improve the cognitive abilities of Malawians, such as progress in academic performance.

Nonetheless, all hope is not lost, as suggested by the aforementioned literature review. For example, Kodish, et al., (2015); Muehlhoff, Bettoni, Westaway, Jeremias, Nordin, & Garz (2016), and Katenga-Kaunda, et al., (2020) suggest that nutrition education and nutrition behavioural change leads to the incorporation of high-quality food into their diets, namely: fruits, vegetables, legumes, nuts, and animal source foods, have the potential to reverse the under-nutrition trend.

However, despite the fact that the findings have the potential to reverse nutrition needs, they have not yet been widely disseminated; as such, the majority of rural population in Malawi continues to be undernourished. Therefore, the impact of development objectives of interventions implemented by the Government of Malawi and its partners remains undermined and untested on a large scale. This finding calls for closing the nutrition puzzle's gap in order to challenge the status quo. Otherwise, if such challenges are not addressed, development outcome expectations must remain conservative. In particular, interventions that depend on the ability of targeted beneficiaries to be cognitively upright, as the key elements of cognitive ability, are greatly affected by the nutrition status of the individuals in the targeted groups.

The underlying assumption of the aforementioned studies is that the effects of nutrition on learning outcomes are positive. Therefore, any intervention seeking to increase gains in learning outcomes should explore complementary effects to improve the nutrition and effort levels of the population. Otherwise, the studies reviewed above have infinite potential impact in driving the nutrition status of the children by targeting linear growth, the age for height, weight for age, and head circumference of the children. However, a gap in the literature still exists on the linkages that such lineal growth has on the ability of the targeted populations to learn and the impact this may have on the development of the curricula and development interventions with a learning scope and cognition as targeted vital objectives.

In addition, the effect of nutrition education on the dietary intakes of households and the decisions they make regarding what to include in their food diets based on the food content has emerged as a crucial factor. This aspect should not be undermined; it requires focusing on parents, particularly in rural areas, and the incorporation of supplementary reading materials and curriculum textbooks. This knowledge is essential for utilising home-grown or locally available foods that have the potential to supplement a diet. The population will graduate from undernutrition to a reasonable level of nutrition status as a result of their diet supplementation.

Having reviewed the literature on nutrition, it is evident that the household plays a critical role in other factors affecting cognitive development, learning outcomes, and other developmental outcomes; the above-mentioned effects are not a panacea. However, these must be implemented in a conundrum involving other household level factors. Therefore, sections of the literature review that follow will focus on household factors that have demonstrated an effect on cognitive development and learning outcomes, complementing the development of a nutrition statute able to deliver development results.

3.6 Household factors that affect children ability to read

The above literature review focused on reading instruction content and common theories that serve as the conceptual foundation for reading teaching materials and pedagogy. A further attempt has been made to show key literature that also attributes better learning outcomes (including reading) to early nutrition supplementation and a generic positive association of better nutrition status to improved learning outcomes. Although these are prominent, and evidence supports their contributions to improved learning outcomes, the environment in which children live has not been evaluated

alongside classroom instruction and nutrition practices. The review below looks at evidence regarding the effects of child environment and household factors on children's reading ability.

In a study conducted on the effect of early home literacy activities on first-grade reading and writing achievements in Arabic, the role of mothers in teaching reading and writing in Arabic was investigated. Results showed that children who practised reading and writing with their mothers acquired Arabic reading and writing skills earlier than those who did not. A collaboration between teachers and parents utilising modern technology has improved the academic performance of children. This validates to a greater extent the use of modern technology for parent-teacher and teacher-parent communication as they collaborated to assist children's learning (Kuusimaki, et al., 2019). While the study demonstrated the effectiveness of communication, the partnership created between the teachers and parents regarding learning support for children is not well defined. However, it is expected that teachers will identify specific challenges children face and that parents will focus on these areas, resulting in improved outcomes. Even though the focus of the study was on modern communication, the unobserved changes in teachers' and parents' behaviour regarding focused support for children's learning are of paramount importance and warrant further research. In well-documented behavioural studies, the aspects of unobserved behavioural change resulting from such experiments or studies were convincingly demonstrated. They showed spillover effects such as enhanced learning ability in pupils supported by parents after interaction with classroom instruction (Gennetian, et al., 2019).

In addition to the preceding discussion, child executive functioning was proven to be more effective with parental scaffolding to learning, other than the home learning environment and language used at home (Hughes & Devine, 2019). These findings indicated that there are a number of factors at play to help children acquire early learning skills whenever the home environment is highlighted in a context where the social-economic status of households was not homogenous. In such contexts, language factors positively influenced pupils' reading comprehension based on working memory capacity. This capacity involved the schema that pupils brought to school and used to learn to read new words when taught how to read in a language that the pupil was familiar with (Harrington & Sawyer, 1992; Dickinson & Belleine, 2002). Therefore, the language spoken at home was crucial to a child's reading capacity.

Other factors that affect learning performance in children include the number of meals consumed daily by the child—following up on pupils transitioning from food-insecure families entering the 1st, 3rd, and 5th grades. Howard (2010) observed that the negative impact of low pupil performance persists through the fifth grade. He concluded that access to food in the early years of life had a positive effect on a pupil's performance. In addition, pupils from food-secure households had better and more consistent academic performance. According to research conducted in the United Kingdom, eating breakfast each morning improved school children's cognitive performance (Wesnes, Pincock & Scholey, 2012). Given the positive effects of meals on pupil performance, it was impossible to isolate the effects of home environment. In addition, we cannot determine how well or poorly they affect children's ability to acquire learning skills earlier in life based on individual studies of their effects. It appears that pockets of analysis assume a constant and uniform social and economic status, which

is highly unattainable, especially in low-income countries like Malawi. Therefore, the factors should be viewed as complementary and emphasised when designing reading interventions.

Another meta-analysis assessed the impact of parental involvement in early childhood and elementary education on children's learning gains and outcomes. Results showed a strong positive correlation (0.509) between learning outcomes and parental involvement. Furthermore, parental involvement (family involvement) was more important than the role of schools and communities (partnership development). The keys to family involvement for a strong relationship were behavioural involvement, home supervision, and home-school connection, while the keys to partnership development were the capacity to engage parents, respectful and effective leadership concerning families and children and institutionalised authentic partnerships (Ma, et al., 2016). Therefore, the findings suggested that there was merit in combining the teaching of reading with the interface and partnership between the school and the parents in order to promote out-of-school learning, reading practice, and availability of reading resources the home. However, a significant finding of this study was that partnerships between parents and schools cannot be viewed as a routine intervention. Instead, there was an excellent requirement that parents modify their social behaviour changes and encourage their voluntary involvement in their children's reading practice. Unfortunately, the reading curricula developers seldom consider this aspect of behavioural change. Often, parents are requested to help with their children's homework as a tick-a-box activity and not necessarily as a concerted routine activity that parents must undertake to observe the progress and identify any reading difficulties they may have. The latter aspect must be instilled in parents so that homegrown

solutions are developed to keep the children on a trajectory that sustains their gains in learning to read.

Another recent study in Malawi has highlighted the critical role that the household plays in building the vocabulary of children in their local languages before they start learning another language. The study also identified the role of the household in developing children's ability to grasp concepts underlying the vocabulary they acquire at a young age. According to the findings of this study, family background and linguistic capital had significant positive effects on learning outcomes, and linguistic capital mediates the reproduction of social class. Lack of linguistic capital disadvantages pupils from lower social classes and non-Chichewa-speaking districts disproportionately (Nishioka & Durrani, 2019). The results demonstrated that learning a second language requires a firm grasp of the concepts in their contextual form and household language before applying the same concepts to a vocabulary developed in a second language. Therefore, the household's role in developing children's language and later learning to read cannot be over-emphasised. Others have concurred that communication between the home and the school fostered the continued engagement of children in a learning environment (Drane, Vernon & O'Shea, 2020). Therefore, providing evidence that language vocabulary development, communication, and contact between schools and families of children enrolled in such schools is essential and worthy of consideration within the implementation context of a reading curriculum.

The development of vocabulary in both the household language and the second language is accelerated when learning takes place in safe environments, whether at home or in school. Several studies supported this claim and showed a statistically significant negative effect of an unsafe school environment on reading and

mathematics achievement (Kibriya & Jones, 2021). Another study conducted in Australia had linked socio-demographic factors associated with trajectories of parental involvement in shared book reading and other home activities for children aged 2 to 6 years. The study showed that higher parental involvement at two years was associated with better learning outcomes at six years. However, the average frequency of parental involvement in home learning activities had decreased over time.

Furthermore, family socioeconomic disadvantage and male gender were associated with lower levels of parental involvement at two years of age and more rapid declines in parental involvement in home activities over time (Hayes, et al., 2018). While the findings of this study agree with numerous other studies regarding the positive role that the household and parents play in their children's education, it raises a very pertinent issue regarding the consistency of support and fidelity with which parents provide support to their children. The findings reveal that parental support diminishes over time, which correlates with the decline in reading skills that children develop over time. This finding illuminates crucial programming issues in the implementation of reading curricula and provides evidence of the context in which reading curricula must be developed and implemented. Failure to match the theoretical curricula with their implementation context undermines the value of resources invested in such initiatives. It cannot sustain the reading gains made by children through school reading instruction. Therefore, the reading curricula and its implementation framework must be modelled. Frequently, curricula developers overemphasise the theoretical underpinnings and the science of classroom instruction, as well as the text that will carry and support the curricula. As such, the developers being trained and experienced in pedagogy and

curriculum content development are done right. Another set of eyes that is not prominent in informing the curricula development is the context assessment.

Afoakwah and Koomson (2021) showed that nearly 88% of children in sub-Saharan Africa would not be able to read by the time they complete primary school. Using household data from the Ghana Living Standards Survey to examine the relationship between school travel time and children's learning outcomes, this conclusion was reached after investigating this phenomenon. Using district variations in school density to resolve endogeneity associated with children's travel time to school and their learning outcomes, they found that more than 90% of children walk to school. Traveling by foot negatively affected their ability to read and write in English or French as well as in their native languages. They further showed that boys, children in rural areas, and those whose travel time exceeds the 75th percentile (30 minutes) had poorer learning outcomes. According to their findings, the number of class hours missed and poor health were the most influential factors that affected learning outcomes (Afoakwah & Koomson, 2021).

These findings showed that distance to and from school issues were just as important regardless of how sound and well-informed a curricula development was. These factors determined the quality of the student who was attending the reading pedagogy daily. Otherwise, thirty (30) minutes of travel to school would result in a tired pupil whose attention to school and participation in the classroom would be diminished by fatigue, preventing them from contributing effectively to their learning. Therefore, even though the emphasis is on pedagogy and content development, it is imperative that wherever

such initiatives are to be implemented, conscious efforts must be made to ensure that the operating context supports the aforementioned complementary factors.

Other studies conducted in Tanzania, Kenya, Uganda, India, and Pakistan assessed the quality of learning in well-resourced private schools and less-resourced public schools. Results indicated that the quality of learning and learning outcomes could not be attributed solely to fixed effects such as the school, but also to the characteristics of the households from which the pupils attending the schools came. In every instance, it was found that private schooling had little impact on the learning outcomes of children from economically deprived households. However, private schooling significantly improved learning outcomes for children from high-income households (Gruijters, Alcot & Rose, 2020). The social-economic status of the household was the only constant in these findings that could explain the variance in the learning outcome results. Therefore, while it is probable that households in higher economic quintiles would have greater access to education resources, be more educated, and be able to afford dedicated support for their children's learning outcomes, the converse was true for households in lower economic quintiles. Therefore, the delivery of a nationally representative curriculum or educational intervention must include special provisions, along with the appropriate level of investment to support low-income households and build resilience in order to support the learning of children from such households.

Another study conducted in China in 2020 supported household resources and characteristics of the most important family members. This study revealed a correlation between parental educational levels and family income, and occupational status. This

crucial variable correlated strongly with children's education, as measured by their Chinese and mathematics scores. Parental education also reduced potential disparities in child outcomes arising from differences in region and Hukou¹. The findings also demonstrated a significant relationship between two mediators and child educational outcomes. In conclusion, the findings showed the significance of improving parenting practices and children's learning attitudes for child development (Qi & Wu, 2020). There is a gap in the development of the national curriculum. Academic curriculum rarely emphasises the aspects of parenting and the development of a learning attitude in pupils. As such, classroom instruction is provided to top pupils from diverse backgrounds and with varying degrees of attitude toward learning and parental support for pupils' education. Consequently, it is widely anticipated that there will be a gap and significant variation in the academic performance of pupils accessing such a curriculum, given a standardised achievement test that is appropriately levelled for the content provided through schools.

Therefore, it is necessary to implement the reading interventions with a calculated effort that increases equity levels and has a calming effect on how children perform in terms of learning outcomes. Such interventions have demonstrated efficacy in enhancing pupil performance when supported. A study conducted earlier involving

¹ A hukou (household registration) is an official document issued by the Chinese government to Chinese citizens. Hukou registration indicates the particular area a person is from, and entitles the registrant to certain benefits in that area; for example, hospitals, schools, or land-purchasing rights. There are two types of hukou: urban and rural. In previous years, urban hukou was highly sought after and difficult to achieve, since it granted registrants access to higher quality education and medical care, as well as opportunities to earn money.

community-based playgroups in low- and-middle-income countries showed that there is potential to increase access to early learning at a lower cost through the playgroups than the learning centres.

Using a quasi-experimental design, the effects of one, two, or three playgroup sessions per week on children's performance on the Early Learning Outcome Measure (ELOM) ($n = 112$; baseline $M = 55.32$ months) were investigated. Multilevel modelling demonstrated significant differences between programmes in ELOM score improvement over eight months of participation ($F = 6.48$; $p = .01$); Fisher LSD Post Hoc pairwise comparisons indicated that three-session playgroups produced greater gains than two and one-session models ($p < .01$). ELOM total scores at baseline, and the quality of children's interactions with adults and peers, predicted growth in ELOM total scores by end line. In addition, baseline age, height-for-age, child-practitioner ratio, and caregiver time for activities with their children predicted growth in certain ELOM domains at the end line. Therefore, well-designed community-based playgroups in adequate doses could improve learning outcomes and school readiness among children from low-income households (Dawes, et al., 2023).

The issue of better-resourced households and pupils' ability to do well in their learning was also corroborated in a household survey where pupils from households with electricity outperformed those without electricity. Students whose households used liquid petrol for cooking and did not have to rely on firewood demonstrated improved academic performance (Adamba, 2018; Frempong, et al., 2021). These studies support that the economic status of households significantly affected the learning processes

and, consequently, learning outcomes of the children from these households, with the exception of outliers in heterogeneous household environments. Additional research indicated that family income influences cognitive ability and study attitude. Among the non-monetary or intangible intervening factors, children's and their peers' educational aspirations and mother-child communication played a significant role in improving children's academic performance. Key to these findings was the fact that the home environment was a prominent setting outside of school that exerted powerful influences on children's school outcomes (Wen, et al., 2020). Of course, it was noted that educational inequality is greater in higher-income countries, posing a formidable obstacle for developing countries seeking to expand school access (Kim, et al., 2019).

Therefore, any curricula intervention based on the assumption of economic growth must include safeguards to prevent the development of inequalities due to the curriculum's resource-intensive delivery. However, the developers are aware that in the absence of inclusive growth, there will be disparities and varying opportunities to access resources, as well as deliberate differences in the academic performance of the pupils accessing such curricula.

3.7 Effect of school resources on the ability of pupils to learn to read

In addition to the development of reading curricula and subsequent efforts by teachers to streamline reading instruction in schools, the nutritional status of the pupils undergoing the reading instruction, and the household factors that influence the ability to read, school resources play a critical role in ensuring that pupils are prepared for reading instruction and have a better environment in which to practise and maintain

their reading skill gains. Several critical factors within a school contribute to pupils' ability to learn. However, literature has shown and validated the evidence that school leadership, positive reinforcements of teachers for pupils who are having difficulties grasping the reading skills, suitable reading materials (different titles of reading material to help build vocabulary and enable pupils to practise their reading skills), a library for lending the textbooks and safe care of the reading titles or stories, and lastly adequacy of classrooms so that the class sizes are manageable are all essential for improving reading achievement. These factors are not exhaustive, but they have proven to be extremely important in helping pupils acquire reading skills, which is why they are discussed here.

Regarding the role of school leadership, a study conducted for English-speaking countries determined that the role of a leader is crucial in supporting education standards in respective institutions. In addition to ensuring that the performance of schools improves, school leaders and other key stakeholders with a management function exist to ensure that the performance of schools is continually enhanced. Those with management roles include school structures responsible for governance, guardians of the students enrolled at the schools, and focus on the functionality of school performance, delivery systems, and resources, as well as stakeholder participation in implementing school visions and missions (Day, Sammons & Gorgen, 2018). In as much as this assertion defines *leadership* as the influence one has over the structures and positions that carry out their work, it also incorporates aspects of having the followers perform the routines rather than self-motivation to lead and influence performance within their sphere of influence, such as the teachers who handle the students. This position is based on a model of successful leadership, which stipulates

that leaders must engage and develop collaborative partnerships with clear accountability and evaluation for evidence-based improvements that result in positive learning outcomes for students in their respective schools (Gurr, 2015). In essence, leaders are urged to go beyond strategic influence at the level of visioning and instead support, coach, and mentor those directly involved in the delivery of learning outcomes. This factor also relates to the assertion of others that putting a lot of emphasis on leadership at the strategic and visionary level far removes leaders from the classroom, teaching, and learning, as well as core technical issues that affected performance (Dimmock, 2015). Thus, concurring with earlier claims that no aspect of school leadership is mutually exclusive; instead, the emphasis must be placed on both strategic and delivery levels of influence.

Other scholars have examined the dichotomy between leadership theories that led to the aforementioned divide. Among the theories are transformative leadership and instructional leadership, which in essence is divided between high-level goal setting for transformative leadership and delivery of the actual learning process linked to instructional leadership. Both models must co-exist in order to positively influence teaching and learning outcomes, the collaborative establishment of school goals and vision, and an awareness of and engagement with external forces affecting their school (Cruickshank, 2017).

Further research indicated that instructional leadership had a greater impact on student achievement, as it was directly related to the changes that must be made to the teaching environment in order for teachers to effectively deliver lessons for the pupils' benefit.

These findings did not cast doubt on the influence and significance of transformational leadership pupils' capacity to learn. One may be aware of and recite the school vision; however, they may not have a personal vision that they need to implement in order to transform their classrooms (Mombourquette, 2017). Therefore, regardless of the overall vision, the impact of any transformative agenda was self-limiting if leadership did not translate the global vision into the work plans and schedules of teachers responsible for delivering the lessons. It had no effect on the results regarding the delivery of lessons and the enhancement of learning outcomes. This conclusive assertion was previously made by others; however, others extended this assertion to include: a demand-supportive leading environment, work objectives, control and delivery, loyalty and trust, collective responsibility, and distributed leadership as an additional layer of leadership platform that others use to propel good learning outcomes in pupils (Aas & Brandmo, 2016)—essentially indicating that, in addition to providing individualised support for teacher's instruction and establishing school vision benchmarks, the leader's relationship with followers was important for achieving the set institutional benchmarks. In a school's institutional structure, this type of leadership was cascaded to multiple layers of influence, particularly for those closest to the action, thereby expediting the delivery of objectives and learning outcomes.

Tan, Gao and Shi (2020) agreed that the role of leaders in improving teaching and learning is not consequential. They concluded that school principals or headteachers are critical in ensuring that learning took place and that pupils performed well, regardless of the leadership model exhibited (Tan, et al., 2020). Similarly, others related leadership models and practice to the management setup that a school adopts and how that management exerts the aspirations and influences of the school leadership

on the pupils for positive reinforcement and improved pupils' learning outcomes (Khumalo, 2019; Zuze & Juan, 2020).

While the majority of literature and studies acknowledged the importance of leadership, whether transformative, instructional or a combination of both, on pupil learning outcomes and the effectiveness of classroom pedagogy, there were exceptions. Taylor, Wills and Hoadley (2019) noted that autonomy in decision-making among school leaders and all levels of influence was critical for effectively delivering pupil learning outcomes for. Otherwise, there was a tendency to perform below the expected threshold when schools' visions and related policies were parroted down the chain of command, typically acknowledging a gap in understanding results in learning outcomes derived from the school's intrinsic needs and objectives. Targeted pupils and results were primarily due to compliance with systemic leadership hierarchies, and school leaders had no particular expectations beyond the fact that some learning was happening. The perception was that duty bearers undertook directions parroted through the system hoping for outcomes.

Using confirmatory structural equation modelling, a study that examined the performance of over 1,779 teachers in 81 Texas elementary schools on the status of school leadership and all the thirteen (13) variables on the four key leadership variables, found that every model of leadership was necessary for the improvement of pupil learning outcomes in schools. Important was a school-wide understanding of the model or path that explained the exceptional leadership that ultimately affected pupil performance. For instance, a transformative agenda widely shared by all cadres of

teaching delivery in schools directly influenced the focus of instructional leadership at the granular levels of lesson delivery, which, if strictly adhered to, would pave the way for success in terms of pupil learning outcomes. If further informed by latent variables that explain transformative leadership, granular factors that were agreed upon to inform the objectives for teachers would directly influence a set of variables that explained instructional leadership in some way. They later affected the performance of the pupils that were enrolled in their respective schools. This finding, therefore, suggested that a combination of the models yields results. Instead, what mattered was the leadership's ability to encourage the voluntary implementation of the vision and teaching methods in classrooms for the benefit of the pupils (Leithwood, et al., 2020). Therefore, it is anticipated that schools with effective leadership will have an impact on the plans, motivation, and delivery of the work ethic by teachers, resulting in improved pupils' learning outcomes. This finding is contrary to the situation in schools that lack a relationship that transcends school principals, their committees, heads of sections, class teachers, and the pupils.

Another area that was overlooked in the literature review on the instruction of reading and the theories underlying the methods of teaching instruction is the availability of learning resources. While it is uncommon for schools to be resourced differently in other parts of the world, it is prominent in low-resourced economies. In such economies, there was evidence that a positive correlation existed between school infrastructure and pupil performance (Llomo & Mlavi, 2016). However, a previous meta-analysis of 400 studies on student achievement found no solid or consistent association between student achievement and school resources (Hanushek, 1997). The phenomenon is not well understood. However, there is no basis to discount aspects of

school resources that may directly impact the ability of children to acquire learning skills in early grades. Therefore, the impact of the granular components of the school resources' principal on children's learning ability must be evaluated and validated.

3.8 Conclusion

In conclusion, it is apparent from the literature that the design of the reading curriculum is informed by a multitude of theoretical approaches. Although every aspect of the theory supports the critical element of reading instruction, none of the theories is perfect; the majority are practical and present an approach that education systems should adopt. However, an approach adapted or adopted for a reading curriculum in any education system must be grounded in the context which it will be implemented. This context includes the ability or capacity of teachers to independently implement the reading curriculum, as well as the necessary support that goes along with the reading theory to deliver a reading curriculum. It further includes the background knowledge of the pupils who will enrol in the reading curriculum, the reading support they will receive within the school and home environments, and the students' ability to use available textbooks and curriculum textbooks for learning purposes under supervision and independently. Moreover, the success of reading approaches, regardless of the underlying theories, will be substantially enhanced when pupils' cognitive abilities are at a level that facilitates the learning process.

In addition to the theoretical underpinnings of design, instruction, and delivery of a reading curriculum, the literature reviewed so far indicates that the early nutritional status of the pupils enrolled in education systems is crucial to the development of their

cognitive ability to handle the reading curriculum. There are emerging results in the scientific literature that a healthy diet has a positive impact on pupils' ability to learn how to read. Further to this, there is a correlation between the heterogeneity of household factors, pupil factors, and the availability of school resources. It is also evident that household, pupil, and school resources positively correlate with pupils' ability to learn. However, there is a gap in available resources for the reading curricula designers to contextualise and isolate critical ingredients of the household. The same holds true for pupil and school resource factors that must be prioritised when designing a reading intervention.

Lastly, the theoretical components of reading, early nutrition supplementation for pupils, factors that influence pupils' ability to learn at home and school, and pupil-specific factors have been studied separately. However, the interplay of these factors and how they affect pupils' learning abilities are yet to be modelled. While subjected to adaptations to the implementation context, this modelling affords the opportunity to engage in a discussion regarding the available literature. This is the literature that designers of reading curricula should consider utilising in order to reap the benefits of the interplays. This will also present an opportunity to potentially add value to the investments made to support education systems in developing a cadre of literate students beginning in the early grades for eventual lifelong learning, including numeracy. Such modelling has the potential to affect the value for money of investments in implementing reading curricula in order to ensure that learning occurs and that reading gains are maintained for the pupils completing reading curricula. The next chapter describes the methodology used to collect data on some of the factors

raised in this review in order to determine factors contributing to the low attainment of reading skills in Malawi.

CHAPTER FOUR

METHODOLOGY

4.1 Chapter overview

This chapter describes and justifies the research methodology. It outlines the research design, approach, techniques, research tools, sampling area, population, processes, and procedures; data collection procedures, data analysis, and triangulation of related results that contribute to the overall research problem. In addition, the chapter discusses the underlying assumptions and limitations of the study and the extent to which the findings can be generalised.

4.2 Research philosophy

The study was conducted using a quantitative research approach. The approach was informed by a positivist worldview. The primary objective of this philosophical position was to derive inferences regarding the causal relationships of variables within the pupil, household, and school resources associated with reading theories. Schmidt-Petri (2003), writing on Mill's philosophy regarding the quantitative research approach, categorised positivism philosophy in research on its ability to hypothetically deduce a process from the theory in literature, construct hypotheses, operationalise relational variables, conduct an empirical study and use findings to advance the theoretical discourse.

Following Mill's definition of positivism (Mills, et al., 2007), and as reported by Schmidt-Petri above, the study examined the theories underlying reading instruction through phonics-based instruction, focusing on whether pupils who master phonics instruction read better than those that do not, in accordance with earlier-described theories. This position was tested through a confirmatory analysis on the null hypothesis stating that mastery of phonics-based reading instruction leads to better reading fluency. After conducting the hypothesis testing, the statistical adequacy of the test results indicated that factors other than phonics instruction may have contributed to the reading performance of pupils. This process resulted in the identification of reading fluency as a dependent variable, which was defined as an observable variable based on the pupils' individual scores on the reading test, which was administered by researchers who were not affiliated with the study in order to reduce bias and improve the objectivity of the findings.

The study defined key independent variables from a pupil, school, and household vector through a factorial analysis that determined the effect level. These variables were then regressed against the dependent variable at the factor level to determine each level's association. After isolating the statistically significant variables at each level, the study modelled an isoquant of factors that explained variations and their effect on the reading fluency of the pupils under study while holding other variables constant.

Positivist research has, over time, relied on the study's internal validity, objectivity, and sampling adequacy to draw inferences about the study's results that are representative (Park, et al., 2020). From this perspective, the study's data collection was done

independently of the researcher's interference by independent enumerators who administered the study tools. In addition, the sample size from the study population was large at fifty percent to ensure that results could be attributed and were representative. This sample size was determined to mitigate the effects of sample attrition and ensure that there were adequate study subjects when data collection was conducted to ensure adequate representation. The study collected data for inferencing from 37 percent at the time of data collection.

Creswell (1994) defined the ontological philosophical underpinnings of a positivist approach in research as having a bearing on the nature of reality based on the assumption that an explained reality exists and can be identified and measured. This understanding allows for studies to attach associations of dependent and independent variables. In light of the heterogeneity of pupil-affecting factors, the study correlated reading fluency with pupil-specific characteristics. As such, each factor within the vector of factors at the level of pupil characteristics had the potential to explain the reading performance of the pupils in their respect. This association was also examined similarly for the vector of variables at the school and household levels.

Furthermore, the positivist philosophical stance on research epistemology contends that knowledge must be developed objectively to be authentic (Bunniss & Kelly, 2010). Therefore, the study methodology detached the researcher from interacting with research participants and study enumerators during the research. The research enumerators visited schools and interviewed pupils independently of the researcher. The positivist axiology also endorses reducing subjective experiences and values in

research through the use of carefully developed research protocols that limit subjective responses from study participants (Ponterotto, 2005). Therefore, the study deployed closed questionnaires that prohibited subjective explanations in the participant responses to ensure objectivity in the study results.

The study's rigour within the positivist paradigm relied on strict adherence to internal validity. This was accomplished by restricting the duration of the study to a maximum of two weeks, thereby limiting the maturation period. In addition, the study adopted standardised reading test protocols, testing association through structural regressions that included other variants that further explained the independent variables prior to attaching association to the dependent variables in order to gain a more comprehensive understanding of the association logic.

Following the quantitative research methodology and the positivist philosophy explained above, the study assessed a population of students who had been provided with nutrition supplementation in their early life. The nutrition supplementation was done with varying intensity levels, ranging from low, moderate, medium, and high intensity. The study followed up with these children seven years post the early nutrition supplementation to follow up on their academic performance proxied by their ability to acquire reading skills to examine whether there was a relationship between early nutrition supplementation and their ability to learn to read. In addition, the study analysed the overall performance of the pupils as measured by their reading scores on multiple subtasks of the reading test. Finally, the hypothesis regarding the theory of

reading based on the phonics-based instruction approach was examined using a chi test based on the results of the test scores.

Furthermore, the study conducted a survey that was divided into three parts. The first part collected pupil data on the individual characteristics of the pupils. The second part of the survey interviewed the pupils about the resource endowment in the households, and the third part of the survey involved observations of resources available at each school where the study participating teachers were enrolled.

The researcher adapted a reading test instrument used by the Malawi Ministry of Education for a levelled and standardised reading test for pupils with an equivalent of two (2) years of education with clearance from the Ministry of Education. After that, trained enumerators administered the test in schools in the study area, after locating the study's sampled pupils. The tests were administered and marked independently of the researcher in a bid to minimize bias. The instruments on the pupil, household, and school surveys were developed by the researcher, piloted by independent enumerators, and refined to ensure that the instruments are objective and the results can be relied upon to accurately reflect reality. Likewise, in the reading test, the independent enumerators administered these instruments without any influence from the researcher.

The researcher verified the scores that the enumerators initially recorded on the reading test, totalled scores by test item subtask for all reading test scripts, and entered and analysed the data in STATA. A similar process was done for the surveys on pupil characteristics and household and school resource endowment before running structural equation modelling to test the association of significant variables within a

vector of variables at each level. These elements were determined by principal component analysis and were associated with reading fluency from the pupils' reading scores obtained earlier. After this, the variables that explained variation in pupils' reading fluency at each level of analysis were isolated and modelled for a final structural equation modelling. This process determined the model that, given the context, would result in successful reading intervention and allow pupils to maintain their reading gains in the early years of primary education. In doing so, this analysis also provided the isoquant factors that any successful reading programme in the context and programme requirements for pupils' sustainable reading gains must incorporate.

4.3 Study design

The study used a survey as a design within the quantitative research paradigm. The surveys were conducted in four parts: i) reading test; ii) pupil survey; iii) school resource survey and iv) household surveys. Details of these surveys are described below:

4.3.1 Pupil reading ability survey

The study used a standardised and levelled reading test adopted from the Ministry of Education and previously used to assess Early Grade Reading (EGRA) skills for pupils with an equivalent of two years of reading curriculum exposure. This process was conducted to determine the reading scores of pupils randomly selected from each early nutrition supplementation programme group described in Chapter 2.

The reading test had five essential sub-tasks that were assessed. The parts were determined to be the essential components of the phonics-based reading instruction used by the study's pupils enrolled on the reading curricula. In the first sub-task, random letters were grouped in a box in a random manner. The administrators of reading test asked the pupils to name the letters pointed to them at random intervals of over one minute per pupil. Each letter that the pupil named correctly was marked up. At the end of each administration of the sub-task, the teacher counted the letters that were named correctly within one minute and recorded the total number of letters read correctly on the reading test sheet under this particular sub-task.

The second subtask of the reading test involved a section in which the letters of the alphabet were again randomly arranged in a box. The administrators of the reading test instructed pupils to sound out the letters that were randomly pointed out to them. The teachers graded and compiled all letter sounds that were performed correctly. The total score was recorded at the end of the administration for each script. This subtask was also administered for one minute per pupil. Therefore, the test recorded the percentage score of letter sounds per minute.

The third subtask focused on reading fluency. Here, the pupils were given one minute to read the words in the paragraph. The teachers listened to pupils read paragraphs aloud and recorded the correct words each pupil read. The words that were read correctly were marked up to calculate the total score on each test sheet for this test item. The score that a pupil obtained on this test item reflected their reading fluency – the

number of correct words that a pupil could read in one minute. The testing of fluency was levelled for two years of education.

The fourth section of the reading test included a subtask on paragraph comprehension. During this subtask, pupils were required to read the paragraph silently within one minute. After reading the paragraph, the pupils were instructed to read the questions derived from the story in the paragraph read and to provide answers to each question. The reading test administrators marked all of the pupils' correct responses. The researcher reviewed and calculated scores on each test sheet that the teachers administered to verify the accuracy of the count. The administration of the reading comprehension test allowed the researchers to determine the reading comprehension ability of the pupils tested.

It is important to note that the subtask of the reading comprehension test did not include pupils who could not read fluently. The basis for this decision was that pupils who were unable to read could also not read and understand the story on their own. Therefore, it was deemed inappropriate to assess these pupils' reading comprehension. Instead, the reading test administrators encouraged and acknowledged the student's efforts, wished them well and gave them a pencil as they disengaged such pupils from the reading test.

The fifth subtask of the reading programme required the pupils to increase their paragraph reading time to a maximum of three minutes. The extension of the reading time gave the pupils more time to read the story and engage with the story. This extended comprehension also gave the pupils more time to search for the answers to the questions based on the story they had just read. The additional time was provided

to determine if, given more time, pupils' reading comprehension performance would improve. This subtask was given to pupils who could answer at least one question from the reading comprehension.

The reading test and all subtasks were administered in Chichewa. The administrators of the reading test were practising teachers selected in the area of the study. All reading test administrators were familiar with the early-grade reading assessments through the training provided by the researcher. The Administrators marked correct answers as explained above, consolidated the scores on each subtask, and the researcher reviewed and scored each questionnaire to ensure that the aggregated scores per subtask were validated before using the results in the analysis. A sample of the reading test is available in Appendix 1.

4.3.2 Pupil survey

The pupil survey followed immediately after the reading surveys. After administering the reading test, the administrators sat down with each pupil. They solicited information from pupils regarding their home environment, physical spaces available for reading practices, and reading-related resources or support available to them after school. This survey was administered to determine the impact of these non-homogenous factors on individual pupils' ability to acquire reading skills.

Specifically, the survey asked the pupils to recall the availability of support, text, and other resources in their homes that they use to learn to read at home. The survey was used to collect information from the pupils based on the fact that the average age of the

respondents was ten (10) years, which increased confidence in their ability to recall accurately. It was anticipated that responses would differ. Therefore, the pupils' experiences would not be uniform, allowing the study to examine the granular effects that the differences in access to supportive items and resources in homes would have on the pupils' ability to learn to read.

In summary, the purpose of the pupil survey was to “find out additional factors that contributed to pupils' ability to read. For example, pupils were asked how frequently they practise reading with peers or parents after school. In addition, they were asked how many times they eat per day, and the number of days they were absent from school in a month was verified by assessing the available up-to-date attendance register. The pupils were also asked to indicate the textbooks they have access to at home and the frequency with which their teachers assign reading homework. The collected data supplemented the explanation of factors contributing to reading by examining the variation of results per pupil-level factors. A sample of the instrument used in gathering factors that affect individual pupils and their ability to acquire reading skills differently is in Appendix 2.

4.3.3 School resources survey

The school resources survey consisted of a checklist of key resources available in primary schools where the selected pupils were enrolled. The survey administrators used the observation checklist to record the number of classrooms at each school. The observation checklist captured a number of factors, including the availability of texts in classrooms, libraries, textbooks, classroom lighting, safe spaces free of bullying practices, and the positive reinforcement methodologies employed by teachers in their

lessons. For a sample of the instrument used to observe the availability of school resources see Appendix 3.

4.4 Sources of data

Primary data was collected from pupils and schools sampled from those that participated in the early nutrition supplementation programme described in Chapter 2, the pupils had a minimum of two years of education. This data included reading tests results and questions about household items that may have supported pupils learn to read. In addition, a survey was conducted to collect information from pupils regarding additional factors that influence pupil reading performance. In addition to these instruments, a survey for school resource endowment helped gather data on school resources based on researcher observation of the quantities of available resources.

4.5 Sampling techniques and procedures

Participants were randomly selected from a list of pupils who participated in the early nutrition supplementation programme in Lungwena, Mangochi. The selection was based on a simple random technique where 50 percent of early nutrition supplementation intervention participants were selected to form a sampling frame. This procedure led to a selection of 420 pupils from the population of 840 who had previously participated in the nutrition supplementation programme in their earlier years (0-36 months).

The study oversampled in anticipation of sample attrition, as pupils in the sample had to be tracked down from their respective schools in the area of study, and the study was conducted seven years after the early nutrition supplementation programme was discontinued. In addition, the sampling was stratified because 50 percent of the sample was based on the nutrition levels that the pupils received during their first 36 months. The sample size therefore consisted of 105 pupils per level of nutrition intervention intensity across the four aforementioned levels. The selection used a simple random strategy. This sampling strategy was implemented to determine the impact of early nutrition on a pupil's ability to acquire reading skills during their formative years. In addition, the study population was in various levels of nutrition supplementation intensity, therefore allowing for an assessment of the relationship between each level of early nutrition supplementation and the reading scores of pupils in each group.

After drawing a sample of the pupils per group of nutrition intensity, the pupils were tracked to the primary schools in which they were enrolled seven years after the implementation of the early nutrition supplementation programme. Tracing the schools where the pupils were enrolled allowed researchers to link the school endowment effect to the pupil's performance in reading fluency; the effects were experienced by all pupils at a given school. However, they differed across schools per the level of resources available to each school.

After identifying the random sample of the pupils, the study enlisted their village of residence and tracked the study participants and information about their enrolment in schools within the study area. When the pupils were located in the area and their

enrolment in local schools were confirmed, they were included in the sample. The confirmation was conducted to ensure that the sample did not suffer attrition due to the non-presence of the pupils because of several factors, including natural attrition and migration of the households to which these pupils belonged.

After completing the sampling described above, some of the sampled pupils could not be located, resulting in attrition from the sample framework. As a result, the following characteristics were associated with the sample size that was obtained: 309 pupils were randomly selected and traced from a potential population of 420 pupils selected at random from a study population of 840 pupils. The sample size achieved represented 37 percent of the sampling framework. In terms of split by level of early nutrition supplementation that the pupils had received in their earlier years as described earlier was as follows:

1. Seventy-eight (78) pupils were sampled, and their presence was verified through tracing from a group of pupils that were provided with a high level of nutrition intensity, representing 37 percent of the total population of 210 pupils who were part of the nutrition intensity group.
2. Eighty-five (85) pupils were sampled, and their presence was traced from a medium-level early nutrition supplementation group, representing forty (40) percent of the pupils enrolled in this nutrition supplementation group.
3. Ninety (90) pupils were sampled, and their presence was verified out of the moderate nutrition level of intensity group, thus representing forty-three (43) percent of pupils in this group.

4. Sixty-seven (67) pupils were sampled, and their presence was verified from the minor nutrition intensity group, representing thirty-two (32) percent of the pupils initially allocated to this level of low nutrition intensity.

In addition to the pupil sampling described above, the study took place in 17 schools in Lungwena, Mangochi, and information was collected from approximately 292 households of pupils interviewed during the survey administration. Notably, the number of households was lower than the number of pupils because some pupils shared households at the time the study was conducted.

4.6 Data collection procedures

As described above, the pupils were randomly selected and tracked down to participate in the study. In addition, a standardised reading test was administered as indicated below:

Firstly, the test had a random letter section where pupils were expected to name the letters correctly within one minute. The letters named correctly were marked for each pupil for scoring purposes.

The second section of the questionnaire required pupils to provide sounds (phonemes) of the letters pointed at randomly. Each correct letter sound was noted for scoring purposes.

The third section of the questionnaire contained a reading paragraph. Again, pupils were given the paragraph to read aloud. For scoring purposes, the number of words a child read correctly in one minute was recorded.

The fourth section of the questionnaire contained comprehension questions. Pupils were instructed to read the questions for one minute and provide answers. Correct answers were marked for each participating pupil and recorded on the test sheet.

Lastly, the children were given an additional three minutes to read the paragraph and answer the questions. Similarly, each test sheet's performance account was recorded for scoring purposes.

Each test item's score was recorded in Excel. The data were categorised according to the level of intensity of nutrition supplementation in order to analyse the performance of pupils based on the level of nutrition supplementation. The study compared the performance of pupils in each nutrition intensity group based on their mean test scores.

In addition to assessing pupils reading performance based on their nutritional status, the study analysed the predictors of reading in phonics-based instruction. This analysis was conducted to test the hypothesis that pupils learn to read more effectively through structured phonics-based instruction that follows the mastery of critical items tested in the reading assessment. The study analysed the performance of the pupils in the key test items in order to understand instructional processes that result in improved reading skill acquisition for children in early grades.

The study also investigated the impact of pupil variables on children's ability to acquire reading skills. In addition to classroom reading instruction, the study identified key factors that affected the pupils' ability to develop reading skills. The key factors that the study considered and collected data on are described below, along with coding instructions are provided. Every child who was tracked and took the reading test responded to a questionnaire regarding these variables.

- a) Time a pupil is read to at home (t): Pupils were asked to report the number of times they have someone who reads to them or teaches them how to read after school hours per week. This was done to assist in triangulating the additional support that pupils receive in an effort to acquire more reading skills, in addition to the reading instruction they receive in classrooms from trained teachers implementing the reading curricula. The frequency with which this support was made available to the pupils was categorised into five possible responses. The coding of the responses for analysis followed the descriptive below.

In the study, we let t represent the potential number of times a pupil is read to after school hours, and took the following values:

$t=0$ representing a pupil who is never read to at home in any week;

$t=1$ representing a pupil who is read to once a week;

$t=2$, meaning a child is read to twice per week;

$t=3$ meaning a child is read to three times a week;

$t=4$ representing a child read to at least four times a week.

b) The language used at home (l). The study was informed by prior findings from literature and theoretical underpinnings that support improved reading abilities of students based on the alignment of the home language and the language of instruction at school. Studies have shown, for instance, that teaching reading in a home language first and then introducing other languages helps pupils acquire the reading skills more quickly than other methods (Nagarajan et al., 2017). Therefore, the study investigated the relationship between language and reading ability, as measured by the reading test scores of pupils who participated in a standardised reading test. Having observed the language of instruction during the administration of the reading test, the study asked the pupils to identify the language they use most frequently at home.

The responses from the pupils allowed the researcher to assess the reading abilities of pupils based on the correspondence between the language of instruction and the language spoken at home. This variable was limited to a categorical binary based on the initial assessment conducted in the study area. Ciyao and Chichewa were identified as the two most important languages spoken in the study area. Therefore, the study let l represent language used in the area, and the following were the possible responses from the children who participated in the research.

$$l_n = 1..2 \dots (4.1),$$

Where $l=1$ meant that a pupil used Chichewa as a home language, and

$l=2$ meant that a pupil used Ciyao at home.

c) Meals that are taken per day (M). The study examined how their families prepare their children for school, including how they are fed throughout the day to have the required energy to participate in the lessons and use that energy to practise reading while at home and with peers. As such, the study asked the pupils to state privately the number of times (frequency) they take a meal per day. This data assessed pupils' reading ability by the number of meals taken daily. The responses augmented earlier findings regarding the effect of nutrition on improved reading ability. This was in addition to other research findings that have linked food intake to better reading preparation among pupils. In addition, a student's ability to read is influenced by the number of kilojoules they consume before, during, and after school. This categorical variable was limited to four degrees of freedom based on the possible standard number of times students are expected to take a meal. In this study, m represented the number of times a pupil takes a meal, where m took the following values:

$$m_n = 0 \dots 3 \dots (4.2),$$

$m = 0$ meant that a pupil took one meal a day,

$m = 1$ meant that a pupil took two meals a day,

$m = 2$ meant that a pupil took three meals a day and

$m = 3$ implied that a pupil took more than three meals in a day.

d) Pupil participation in school (P). The study is aware of the evidence indicating that pupils who consistently participate in classrooms have better chances and ability to learn than those who do not. In light of this, the study incorporated this variable to determine how pupil participation affected pupils' abilities to

read. This inclusion was done to ascertain and assess how reading curriculum developers integrated this contextual factor into the design of the reading programme. To obtain such data for purposes of the analysis, the enumerators checked the classroom registry for each pupil who took the test to monitor consistency in classroom attendance. The records were taken for each pupil who took the reading assessment, indicating the reported number of days the student was absent in a month. Inter-rater reliability was used to determine whether the ratings provided by the respondents and classroom teachers were consistent. This evaluation was conducted on a sample basis to ensure the quality of responses from the pupils and to implement corrective measure, such as readmission of questionnaires with low intra-rater reliability score. The responses from the pupils were categorised according to four degrees of freedom and presented as follows:

The study let p represent pupil participation in class, where

$$p_n = 0 \dots 3 \dots (4.3),$$

$p = 0$ meant that a pupil was never absent in the past month;

$p = 1$ meant that a pupil was absent once in the past month;

$p = 2$ meant that a pupil was absent twice in the past month; and

$p = 3$ meant that a pupil was absent at least three times in the past month.

Further to the factors directly related to pupils and affecting their ability to read, as mentioned above, the study evaluated additional school resourcing factors previously found to influence how well pupils learn reading (Social Impact Inc., 2014). These factors were assessed and recorded through observations conducted at each school by the researcher. The school resource factors that were evaluated in the study included the following factors:

- a) Availability of latrines for girls: The researcher counted the number of latrines in each study-participating school. Of key interest to the study was to check whether the unavailability of pit latrines for girls significantly affected their school attendance for sanitary reasons or otherwise.
- b) Latrines for teachers: The study also observed the availability and cleanliness of the latrines available at the school for teachers for sanitary reasons and examined whether the latrines' availability or non-availability for teachers affected their classroom attendance, instruction time or pupil-to-teacher contact time.
- c) Teaching staff room: The study made an additional effort to observe the spaces available for teachers in respective schools for preparing and grading pupils' assignments, as well as for ongoing teaching development support that uses staff rooms for peer support.
- d) Class spaces: The study also observed the availability of classroom spaces as measured by the number of pupils per classroom, as well as the presence of spaces within the classrooms that the students could use to move around and those that teachers could use to conduct follow-ups on the pupils' performance.

- e) Well-kept grounds: The study assessed how each school that participated in the reading test maintained its grounds. This observation was conducted to examine how inviting the grounds were for child play during breaks and home time and also the ability of such grounds to attract pupil attendance in the respective schools.
- f) Availability of electricity: The study further assessed the availability of electricity in the participating schools. This observation was conducted to examine the association between lighting and pupils' ability to learn to read. This association was anticipated because electricity has the potential to extend the learning day or the time available for pupils to learn to read.
- g) Access to clean water: The study examined the availability of clean water in the vicinity of the schools as well as within the school grounds. The availability of clean water was evaluated with the understanding that contaminated water is likely associated with water-borne diseases. The prevalence of water-borne diseases in the area affects pupil attendance. It thereby significantly reduces the time pupils spend on their learning and has the potential to affect their learning outcomes, including their ability to acquire reading skills at an early age.
- h) Textbook availability: The study examined the availability of additional textbooks that were not included in the reading curriculum's core textbooks. The purpose of this objective was to determine how effectively the school is working to improve the vocabulary and reading comprehension of its pupils by providing alternative texts from which the pupils were expected to develop further reading skills and apply them to their learning efforts.

- i) Teaching guides' availability: The study further evaluated the availability of teaching guides in the classrooms. The purpose of this observation was to evaluate the reading curriculum's implementation. This observation also helped the study validate the fidelity of implementing a scripted lesson plan for reading curriculum teachers to follow.
- j) Availability of a well-stocked library: The study also observed the utilisation of the library resources, focusing on the records for lending the materials, use of the materials taken from the libraries, and also the variation of titles in the library, as well as the levels of the reading materials that were available in the libraries or places designated by the school as libraries. The assumption underlying this factor is that access to a variety of titles aids in the development of pupils' vocabulary and reading skills. Therefore, the study expected that pupils who are exposed to more reading titles have a greater chance of learning to read more quickly than those who are not.
- k) Existence of teacher mentoring and coaching: Under this factor, the study observed how the schools utilised teacher mentors and coaches for peer support during classroom teaching or for other purposes.
- l) Availability of desks: The study also examined whether or not the schools had sufficient desks. This observation was conducted in an effort to identify responses that may have differentiated school environments and learning environments, thereby associating such responses with pupil performance.

The factors listed above were coded '1' for yes (availability) and '0' for 'no' (unavailability) during data capture and further analysis. The study used a Principal Component Analysis (PCA) method to analyse and index them to determine variables that have a significant impact on pupil performance. This method reduced complex data sets to a lower dimension in order to reveal the sometimes hidden, simplified underlying structures. In addition, the PCA ensured that only those variables with a greater influence on the ability of pupils to learn to read were included in the analysis, while others were excluded. After completing the aforementioned steps, the study collected data on student performance through reading assessments, pupil data through interviews with pupils using structured questionnaires, and school resources data by completing school resources observation sheets for each school where reading performance data was collected. In addition, all pupils who took the reading test had all data points attached to their records for study analysis procedures, interpretation, and discussion of results.

Table 1 below summarises the data collected, the instruments used to collect the data, and the information collected per each instrument.

Table 1: Snapshot of data collection instruments per objective

Specific Data collection Objective	Data collection instrument	Data collected
Assess pupils' performance in reading based on a phonics-based reading curriculum.	Standardised reading test	The ability of pupils on the following reading tasks: Letter naming Letter sounds Letter knowledge Syllable reading Reading fluency, and Reading comprehension
Investigate how the contextual factors in the environment of the pupils, including the early nutrition status of pupils, predicted their ability to acquire reading skills in earlier grades	The household questionnaire that was administered to pupils who participated in the study	Number of meals pupils take in a day Number of times pupils practice reading Availability of reading materials other than textbooks in their households Pupil growth (head circumference and height) School attendance Morbidity, and After school reading support.
Assess how the availability of resources in schools and households affected the ability of the pupils to learn to read.	School resources and household questionnaire	Availability of school resources (e.g., library, teachers, supplementary readers provided to pupils) School leadership Support provided to teachers on reading instruction Availability of continuous professional development

4.7 Data analysis

The study entered data from the reading scores per individual student with their names blinded in the MS Excel database to maintain the privacy of pupils who participated. In addition, household and student-related information for each student was included in each record, along with information regarding school resources for sampled schools. Data entry for each record was categorised into four parts following the treatment levels described earlier to allow for inter and intra-analysis of the performance of pupils based on the levels of nutrition intensity for supplements received. The database created above enabled essential procedures described below that were taken to analyse the data. The following procedures were implemented for each key area of interest:

- i) **Relationship between early nutrition supplementation and pupils' ability to acquire reading skills:** The study employed a reading test that was administered to randomly sampled pupils from each level of nutrition intensity. The pupil performance was scored and numericised in order to assess the previously noted cross-linkages and to enable comprehension of variations in pupil performance per group of pupils who received varying levels of nutrition supplementation in early life. This was done to determine whether or not there is a correlation between the intensity of early nutrition supplementation given to pupils in their early life and their ability to acquire reading skills. The reading skills in question included pre-reading skills (letter naming and letter sounds), formative reading (oral reading fluency), and comprehension skills. The following specific tests were conducted as part of this evaluation:

- a) **Mean scores:** These were calculated for each of the aforementioned categories pertaining to pupils' abilities to name a letter, recognise a letter, listen and answer questions from a story read to them, and answer questions from a story they read themselves. The mean scores indicated the students' reading ability in relation to the intensity of nutrition treatment they received. The results allowed for an evaluation of their performance in acquiring reading skills.
- b) **Standard deviation:** For each nutrition intervention, scores were calculated for each test component. The standard deviation assisted in identifying differences in pupil performance within the treatment group. It also helped to understand the nutrition practices based on the counselling that each group received and to examine the sustainability of those nutrition practices that attest that once a nutrition practice is acquired, it becomes a lifelong practice, thereby anticipating that the nutrition practices developed by parents for each group of pupils will endure and that pupils from each group will perform within a reasonable range.

Results from this data procedure provided a picture of the effect that nutritional supplements may have had on pupils' ability to acquire a better capacity for learning, which, all factors being equal, may have affected their ability to acquire reading skills. Notably, these results were used as an indicator to the association between early nutrition supplementation and the development reading skills. However, after relaxing the aforementioned assumption, an additional attempt was made to assess the impact of nutrition and other contextual factors on the ability of pupils to acquire reading skills, with the knowledge that improved nutrition is not a panacea for the pupils' reading

learning difficulties. Therefore, there are additional factors within the context that affect and supplement pupils' the ability of students to learn to read.

a ***Analysis of predictors of classroom instruction in the teaching of reading***

According to one of the study's hypotheses and reviewed evidence, phonics-based reading instruction helps students acquire reading skills more quickly. The study examined reading ability as revealed by performance in letter naming and letter-sound identification tests. A one-way analysis of variance was used with reading fluency as a respondent variable, whereas letter naming and letter-sound identification were the explanatory variables. The following steps were taken during the analysis of variance:

- i. *Assessment of variable means:* The study assessed statistical differences in the standards by comparing the p-value (0.05) to significant variables (α) levels. With any $P\text{-value} \leq \alpha$, the differences between some of the means would be statistically significant; otherwise, any $P\text{-value} > \alpha$ would mean that the differences between the means are not statistically significant. In the first instance, this would entail accepting the null hypothesis that there is no correlation between performing well in letter naming and sounding and the ability of pupils to learn to read. The study will accept the null hypothesis regarding the relationship between better performance in naming and sounding the letters and reading fluency.
- ii. *Assessment of model fit:* The study conducted a model fit test. The study examined the goodness of fit statistics based on the summary table in the test. This examination was done by calculating the percentage of response variation explained by the model (R^2). Decisions on the goodness of fit were

based on how high the value of R^2 was and validated by residual plots to verify that the model fit met the assumptions and further validate the study hypothesis that mastering the naming and sounding of letters predicted reading fluency in the study context. A model fit (R^2) greater than 0.9 was regarded as high; otherwise, it was explained by theoretical factors that resulted in a lower R^2 value.

- iii. *Assessment of the effect of the pupil, household, and school resources on the ability of pupils to acquire reading skills:* The literature review revealed that pupil, household, and school resources have individual effects on the ability of pupils to learn to read and that their combined effects would better explain reading performance. Therefore, the study used a multilevel regression analysis to determine how each of these factors affected pupils' acquisition of reading skills in the study area. The analysis was conducted on all granular aspects that data was collected on and classified them into a vector of variables that explained pupil, household, and school resources. The data procedure for this analysis was performed as follows:

b Model specification on contextual factors associated with pupils' ability to read

Data structure: The data structure comprised the following levels: Pupils (level 1) nested within households (level 2) and also nested within the schools (level 3). Due to the three-level nature of the data structure used to measure these effects, three-level Generalised Structure Equation Models (GSEM) were first employed to examine the effects of observed and latent variables for pupil-related factors. The same procedures were used to assess household-related factors and the effects of variations in school resources based on the schools in which the pupils were enrolled.

Model Assumptions: The study assessed the following model assumptions before utilising the structural equation model on the factors at the aforementioned levels:

Data normality: The study used p-plots and q-plots to normalise the indices for each primary variable before inclusion in the model.

Missing data: The data was thoroughly checked for minimal missing data in the data set. Where cases of missing data were observed, the data points were traced for all practical reasons by making follow-ups and ensuring that responses to the various data instruments were recorded.

Measurement and sampling errors: Variance for all variables in the study was minimal, therefore preventing small standard errors, which prevent normality of data.

Data fit: The model was assessed through Chi Square, where an $X^2 \leq 2$.

Exploratory data analysis procedures: The following data procedures were conducted to ensure that the data used in the model is suitable and fit for use in regression analysis:

Response variable: The study numericised response variables (scores for letter naming, letter sounds, reading fluency, comprehension, and extended comprehension) into 101 percentage points (0-100%), and other descriptive statistics such as the mean were calculated based on the numericized response variables.

Normality of residuals of mean scores: The study used p-plots on the data to determine normality. This normality test was done to ensure that the data were not normally distributed. The data was centered by standardising with z-scores and fitting the assumptions in modelling regressions in the analysis.

Defining the structural models: Based on the levels of analysis, the model was analysed at the pupil, household, and school resource factors as detailed below. This was done to examine the effects of these factors on the ability of students to learn to read. From the analysis at each level, the study identified significant factors that explain the ability of pupils to read.

Pupil factor variables: To model the effect of pupil factor variables, the study let η represent latent variables up to a total of k ; j represented observable variables, and λ_{jk} represented a regression of variable y_j on the factor of the j th observed variable predicted by the k th latent variable. Therefore, the structural equation for the pupil factors was specified as follows:

$$y_j = V_j + \lambda_{jk} + \eta_k + \epsilon_i \dots (4.4)$$

where V_j was taken for the intercept in the regression.

The composite observed factors in λ_{jk} included pupil early nutrition intensity group, height and head circumference of the pupil at the time the reading test was administered, the status of the pupils regarding whether they attended nursery or not, the places where pupils read, whether they received reading homework, and number of times they practised reading. The latent factors (η) included a multilateral latent (the number of meals taken per day by the pupils) on observed variables such as the nutrition group to which the pupils belonged to, as well as their height and head circumference. In addition to this, the model included a latent variable (bullying) regarding pupil attendance. The latent variables were identified as having indirect influence on the

observed variables, e.g., the number of meals taken per day would indirectly influence the height and head circumference of a pupil regardless of nutrition received during the early formative years, especially since the pupils were followed up after seven years after the nutrition intervention. It's possible that food has no direct effect on a student's reading ability. However, they affect a pupil's height, which is positively linked to less stuntedness, reduced morbidity, agility, and improved participation in learning, as according to the literature review. Similarly, the severity of bullying at a school affects pupil school attendance, which in turn affects how well a pupil learns in class, thereby indirectly influencing outcomes such as the ability to read, ϵ_i is the error term. The path diagram showing the relationships described above is presented in Figure 6 below.

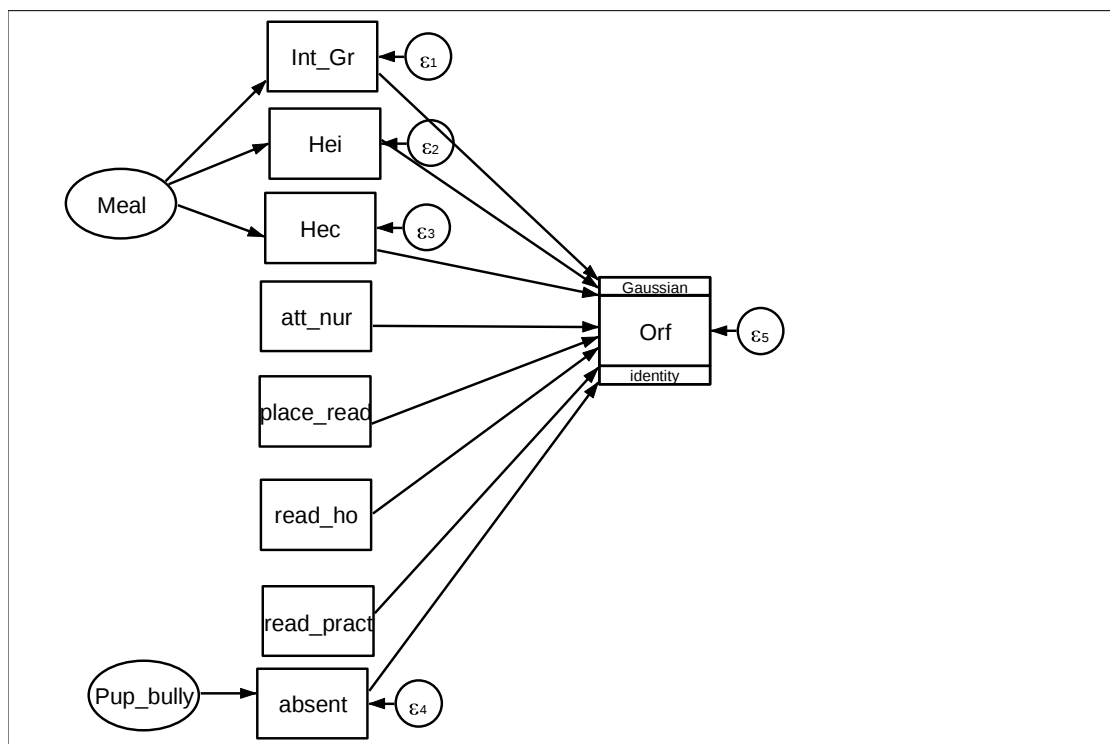


Figure 6: Path diagram for factors that affect pupil's reading abilities

The variables in the path diagram in Figure 6 are defined in Table 2 below:

Table 2: Definition of variables affecting pupils' ability to read

Variable	Definition of variable	Unit of measurement
Int_Gr	Nutrition intervention group that a pupil belonged to. This was based on the level of nutrition intensity the pupils received in their first 36 months as part of an intervention by the Malawi College of Medicine and Finland's Tampere University in Lungwena, Mangochi – the case study area.	Nutrition intensity level
Meal	The number of meals pupils took in a day was based on pupils' recollections during the interviews. The respondents' average age was ten (10). Therefore, the researcher anticipated appropriate responses based on the age range.	Meals taken per day by a pupil
Hei	This represented the height of each pupil who was interviewed during the study. The pupils were measured by the teachers who administered the questionnaires to ensure accuracy in the recorded height.	Height of a pupil
Head Circumference (Hec)	This represented the head circumference of each pupil who participated in the study. In addition, before administering the pupil questionnaire, the teacher-research assistants measured the head circumference of each pupil.	Head circumference of a pupil
Pres-school attendance (Att_nur)	This represented whether the pupil enrolled for preschool learning activities before enrolling in primary standard one (1).	Attendance of pre-school by a pupil
Places where pupils practice reading at home (Place_read)	This represented the places where pupils spent time reading textbooks and non-textbook supplementary reading materials after school.	Spaces for practicing reading by pupils
Reading homework taken by pupils (Read_hmwrk)	This represented responses from pupils regarding whether the teachers assigned reading homework to the pupils and whether teachers followed up on the homework when the pupils returned to school. The study also collected data regarding the frequency with which the reading homework were assigned.	Reading homework taken by pupils

Variable	Definition of variable	Unit of measurement
Reading practice by pupils in homes (Read_pract)	This variable represented the study with responses from the pupils regarding whether or not they practiced reading alone or with peers after school.	Times a pupil practiced reading at home
Oral reading fluency (Orf)	This variable represented oral reading fluency, which was measured by the number of words each pupil was able to read in one minute following a Reading passage/paragraph that was provided in the reading test, and which included sensical words – words that the pupils could make meaning from their reading.	Number of correct words read by a pupil per minute
Presence of bullying in schools (Pup_bully)	This represented individual pupil responses regarding the experiences and prevalence of bullying at their respective schools, which may have made them fearful of attending and participating in school processes, such as the reading classroom instruction provided by the teachers trained to deliver the reading curricula.	Presence of bullying in schools

The semblance of the structured model on the above variables and how they relate to the pupil's ability to read is presented in Figure 4.2 below. The path diagram showed that, theoretically, the number of meals taken in a day directly relates to the height, head circumference, and level of nutrition intensity a pupil got. This relationship is consistent with findings from other studies (Baskale, et al., 2009).

Furthermore, the study was informed by the literature that postulates that there is a direct correlation between the extent of bullying in schools and pupil attendance and participation at school. This evidence suggested that with increased bullying, pupils tend to avoid school and limit their participation in teaching and learning out of fear of retaliation from bullies. As highlighted in the literature review, the variables were

known to affect development of pupils' reading skills, hence their inclusion in the path diagram presentation (Aram, Korat & Arafat, 2013; Bretton, 2018; & Gennetian, et al., 2019).

Furthermore, the path diagram shows an observable relationship between places made available for pupils to practise reading in their households and the fluency with which they read. In addition, there was a direct relationship between the reading performance of pupils and their ability to learn to read. Lastly, there was an expected positive relationship between the number of times a pupil practises reading and that particular pupil's performance in a reading fluency test; thus, the direct relationships shown in figure 1 above, in addition to the relationships explained above.

The study further examined the household factors that influence pupil's ability to read. The model for household factors was specified as shown in the following equation:

$$y_j = W_j + \psi_{jk} + \eta_k + \varepsilon_i \dots (4.5)$$

Where W_j is the intercept in the regression, η represents latent variables up to a total of k ; j represents observable variables, while ψ_{jk} represents a vector of observed variables for the regression of variable y_j ; on factor of the j th observed variable predicted by the k th latent variable. Variable y_j is the reading performance vector explained by pupils' ability to name letters, read syllables, reading fluency, and demonstrate reading fluency, comprehension, and extended comprehension as numericised in the range of 0-101 above.

Variables that were considered in ψ_{jk} included books available in households that are not school textbooks, books that the household rented from other sources, places where pupils read when at home, and who read to them while in the household was the multilevel latent variable that explained some extent of changes in the observed variables listed above. This was the case due to the possibility of children supporting each other to read at home, as well as parents and pupils reading on their own during reading practice. However, the study assumed that the reading materials' resources would vary depending on who was providing reading support at any given time. The effect path diagram for the household level variables that explained variation in pupil ability to read is presented in Figure 7 and further defined in Table 3 below.

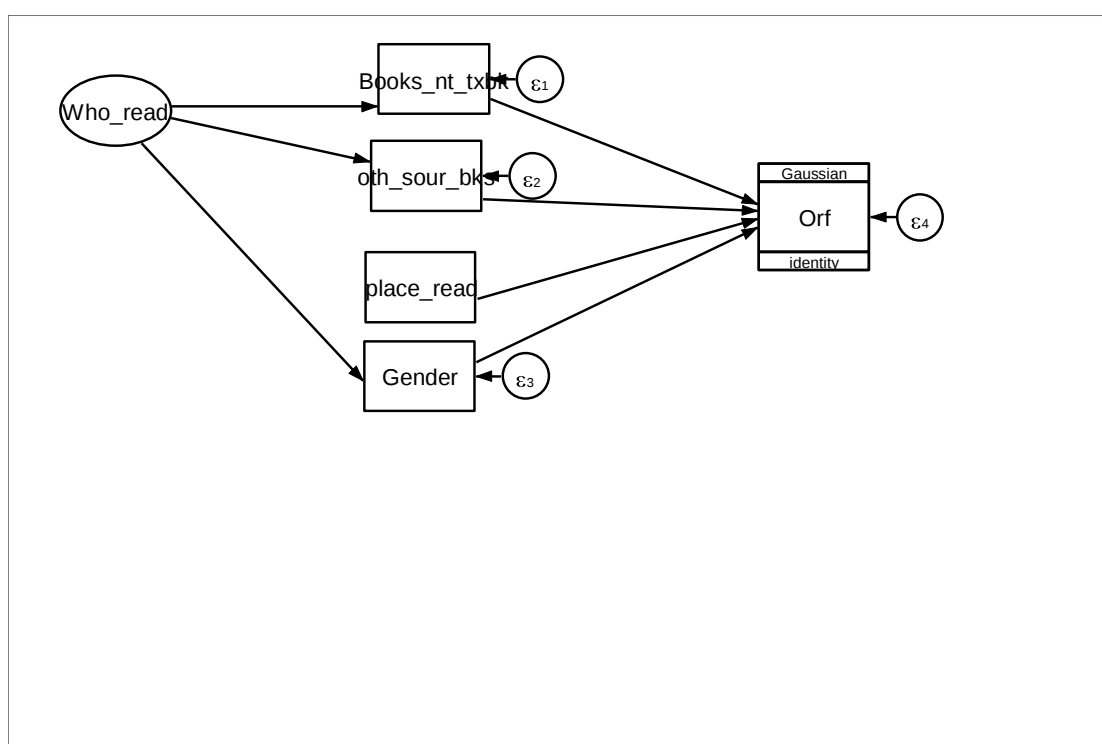


Figure 7: Path diagram for household factors that affect pupil ability to read

The path diagram above shows the expected relationship between household factors and how they influence pupils' performance in learning to read. The variables are defined in Table 3.

Table 3: Definition of household factors that affect the ability of pupils to learn to read

Variable	Definition of variable	Unit of measurement
Person reading to a pupil at home (Who_read)	This represented people available in a home who are responsible for reading aloud to pupils during their free time, after or before school. Pupils who participated in the study were asked to indicate to the interviewers the person who supports their reading practice, including reading of textbook stories.	Persons who read to pupils at home
Supplementary reading titles (Books_nt_txb)	This represented books available in pupils' households. The pupils were asked to indicate the number of books they have seen and have access to for reading practice. These were not textbooks from the reading curricula that were otherwise distributed uniformly to pupils for use.	Number of supplementary reading materials available in pupils homes
Sources of supplementary reading books (Oth_sour_bks)	This represented the types of sources that were available to the pupils in the households. The pupils were asked to indicate where they obtain books with supplementary reading stories that they access and read in order to expand their vocabulary and improve their comprehension.	Number of sources of supplementary reading materials available to pupils in homes
Gender	This represented the sex of the pupils that participated in the study.	Sex of a person who supported pupils practice reading
Z-mscore	This represented the numericised scores for oral reading fluency	Composite reading score for pupils from the reading test.

Further to the variable definitions provided above, the path diagram in Figure 4.3 assumed that the latent variable (who read) was a factor of available books that were not textbooks, essentially adding available options for practising reading, similar to the availability of supplementary readers. Furthermore, the availability of conducive places

and the gender of the person supporting reading in households also depended on the gender of the person supporting the reading process within the households. The gender perspective was significant because women are more likely than men to support pupils' reading ability (Kachiwanda, 2010). Thus, the t latent variable and the observable variables affect pupils' reading ability (Aram et al., 2013).

Similarly, the study examined the effects of school resources on pupils' reading ability. The model was specified in the following equation.

$$y_j = U_j + \varphi_{jk} + \eta_k + \varepsilon_i \dots (4.6)$$

Where φ_{jk} was a vector of school resource variables observed for the regression of variable y_j ; on factor j th observed variable was predicted by the k th latent variable. Variables y_j , η_k and ε_i remain as previously described. The path diagram for the structural equation in (4.5) is presented in Figure 8 below.

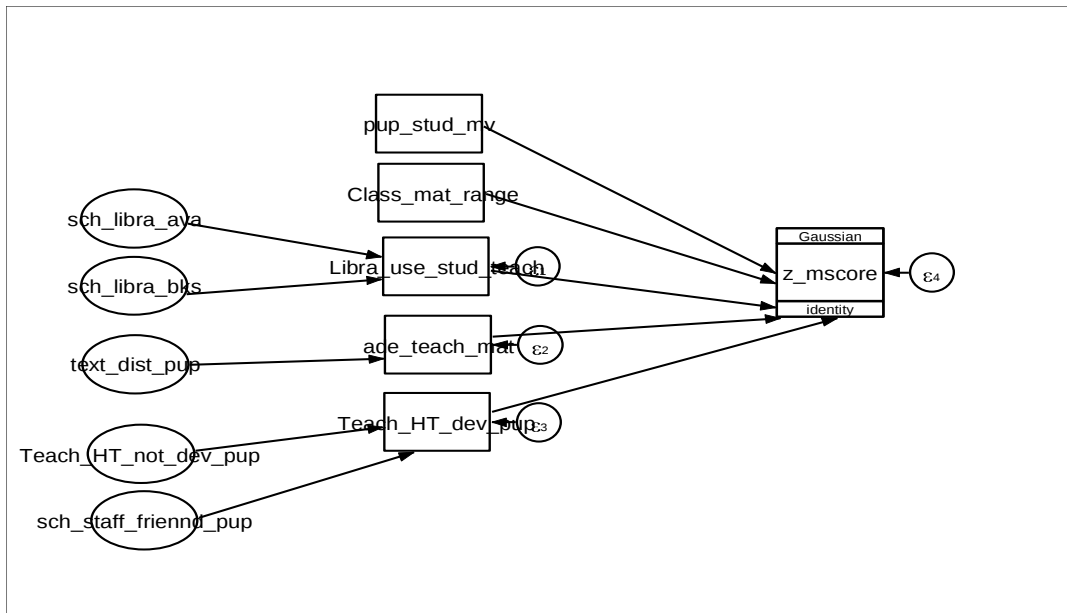


Figure 8: Path diagram for school resources that affect pupil's ability to read

In Figure 8, the latent and observable variables were defined as presented in Table 4 below:

Table 4: Definition of variables for the path diagram at the school level

Variable	Definition	Unit of Measurement
Sch_libra_ava	This represented the observable and recorded data regarding the availability of well-resourced library in schools that participated in the reading test. The observation included make-shift libraries, including the shelves and boxes that some schools use as a library, especially where levelled books were kept for the age specific pupils and suitable for practising reading at such a level.	Availability of school library at a school
Sch_libra_bks	This represented the availability of prescribed books that pupils borrow from the school. These books were often kept in boxes in the head/class teachers' offices in the schools that participated in the study.	Stock of library books available for lending to pupils
Text_dist_pup	This represented the availability of textbooks distributed to pupils for reading practice in their homes. The researcher validated the distribution of such books by inspecting library stock books and records of borrowing by the pupils.	Availability of textbooks distributed to pupils at a school
Teach_HT_not_dev_pup	This referenced the researcher's observation and inquiry into the practices of each school that participated in the study practised in terms of the extent to which teachers provided learning support to pupils to enhance the acquisition	Lack of Instructional support provided teachers to pupils

Variable	Definition	Unit of Measurement
	of reading skills in the classroom or school environment, including the availability of text and letters in spaces commonly used by the pupils at the school.	
Sch_staff_friennd_pup	This referred to the observation by the researcher on how friendly the school staff were to pupils at school. This included both the observation and inquiry through sampled interviews with both the pupils and the teachers. All observations were duly recorded on the observation standard rubric and used in all participating schools.	Collegial and friendliness of teachers and school staff to pupils
Pup_stud_mv	This referred to the observations and recordings regarding the nature of the school environment, including whether the pupils were motivated to learn as a result of the environment and physical resources that attracted and increased their attention span to acquire reading skills.	Conducive school environment for pupils to learn
Class_mat_range	This referred to the availability of a variety of learning materials available in classrooms where the pupils learned to read. This information was collected because learning materials provide pupils with alternative learning aids that they can use to develop their phonology, reading fluency and comprehension strategies and skills.	Adequacy of learning materials at a school
Libra_use_stud_teach	This referred to the ability of teachers and pupils to utilize the available library facilities. This data was collected through the	Utilization of school library by the pupils and teachers

Variable	Definition	Unit of Measurement
	researcher's observations of the teachers and pupils	
ade_teach_mat	This referred to the adequacy of teaching materials in the participating schools. This data was obtained by observing the teaching aids that the teachers used during instruction.	Adequacy of teaching materials in schools
Teach_HT_dev_pup	This referred to the practices implemented by head teachers to provide leadership that transforms teachers' instructional practices in accordance with the school's aspirations. This results in teachers supporting the pupil's reading skill acquisition.	Instructional support provided by head teachers to teachers

The study found that pupils and teachers could only utilise a library if it was available in schools and stocked with appropriate books for pupil use. Therefore, the study included the latent variables of the availability of school libraries and books. As a result, they predicted the use of library resources, which in turn further predicted the extent to which pupils obtained reading skills. In addition, the study revealed that schools could only distribute textbooks if sufficient quantities were available. Thus, the study proposition was that the distribution of the textbooks was contingent on material adequacy. Where this occurred, pupils had the opportunity to read the books at home, thereby improving their reading skills.

Similarly, teacher friendliness towards pupils and their willingness to support pupils' learning and acquisition of reading skills created an atmosphere where pupils felt comfortable seeking reading remediation. The inherent assumption was that pupils who

enrolled in schools where it was easier to seek remediation had an advantage in acquiring reading skills. Therefore, teacher friendliness and ability to support the acquisition of latently determined the reading practice environment and the frequency with which a pupil practised reading outside of the school timetable. Such amenability to reading practice and remedial learning predicted pupils' ability to acquire reading skills.

Having assessed the effects of the pupil, household, and school resources on the ability of pupils to learn to read, each vector of a factor in its own right; the study identified vectors that significantly explained variation in pupils' ability to learn to read. The study further fitted a model that explained their effects on pupils' ability to read. The model was specified as shown in the equation (4.7) below.

$$y_j = U_j + \gamma_{jk} + \beta_{jk} + \xi_{jk} + \eta_k + \epsilon_i \dots (4.7)$$

Where γ_{jk} is a vector of pupil factors that significantly explain the performance of pupils in reading and are observed for regression y_j ; on factor j th observed variable predicted by the k th latent variable. Variable β_{jk} is a vector of household factors found to be significant in explaining pupil reading performance and regressed on y_j ; on factor j th observed variable predicted by the k th latent variable that is relevant from equation (4.1). ξ_{jk} is a vector of variables from school resources observed to explain variation in pupil's performance in reading regressed on y_j ; on factor j th observed variable predicted by the k th latent variable that is relevant from equation (4.6). y_j , η_k and ϵ_i remain as described above.

The path diagram for equation (4.7) is presented in Figure 9 below, and the variables remain as previously defined in Tables 2 and 3 above.

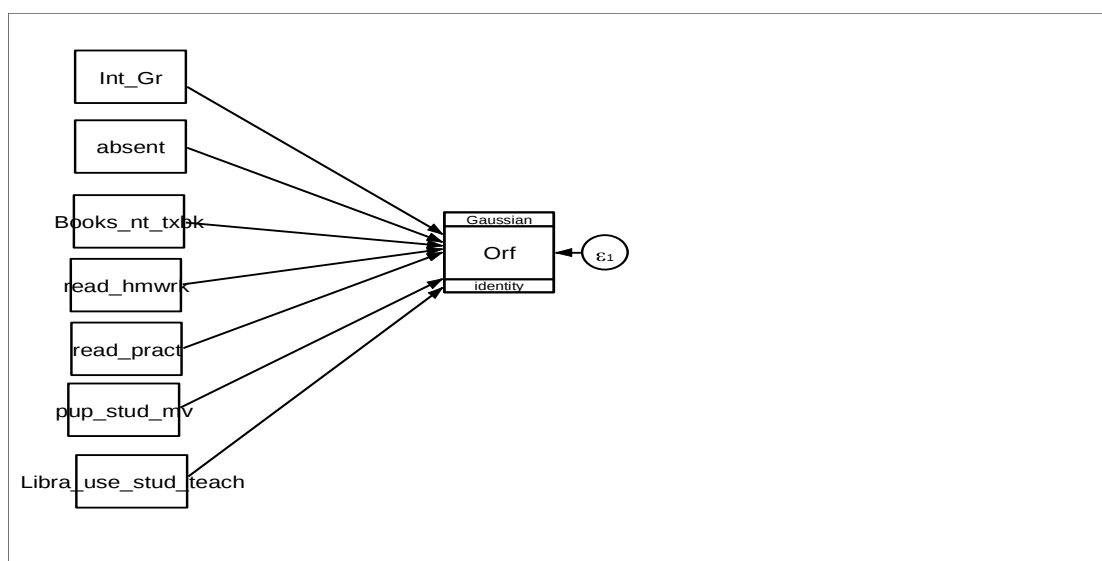


Figure 9: Model of factors that affect pupil's ability to acquire reading skills

4.8 Ethical consideration

Study ethics were considered for the validation of the study instruments, data protection, and the minimisation of bias in data collection, including the administration of the EGRA test. Ethical clearance was obtained from the Ministry of Education since the study involved using a reading test and collecting school-related data. The clearance ensured that the questions in the study were appropriate at the right level, and relevant to the pupils' age range. All data collected were safeguarded by the researcher in a password-protected database. In addition, participants in the study were anonymised through unique identification numbers to ensure that data cannot be traced back to specific respondents.

The data collected were used exclusively for this study. The database will be kept for no longer than seven years. The researcher will have access to this data and it may be used for academic publication after the study is concluded. After the storage period expires, the data will be destroyed in physical and soft storage to ensure highest level of data protection.

Teachers trained by the researcher administered the reading test. The teachers were assigned to schools purposively to eliminate any conscious or unconscious bias that may arise during the administration and grading of the reading test by preventing testing of students from their own schools. Teachers were selected to administer the reading test based on their prior training in handling pupils of the given age range. It was crucial that those administering to children in the age range of the study have experiences handling children of such age range, so that pupils are comfortable and are willing to participate in the reading test and the individual interviews that were conducted during the study. An informed consent was read to the pupils before the interviews and school leadership formally consented for the administration of the reading tests in schools (See appendix 1 and 4).

4.9 Scope of the study

The surveys conducted during the study were limited to individual, household, and school resource endowment factors that affected pupils' ability to acquire reading skills. The study collected information about household factors affecting pupils' ability to acquire reading skills through interviews with the pupils that sat for the reading test. Furthermore, the survey on school resources was conducted by survey enumerators

through observations using a carefully crafted checklist to ensure objectivity. However, the survey observation instrument did not have tools for observing reading instruction by teachers, as all teachers followed a scripted lesson plan in their respective classrooms. Therefore, the analysis and interpretation of the study's results are limited to the scope of this survey.

4.10 Conclusion

In conclusion, this chapter has presented a quantitative research paradigm in answering the specific objectives and the thesis in the problem statement. It has highlighted methods and details of data collection that forms the basis of the analysis and presentation of the results in the later chapters. Granular methods and approaches are presented to allow others replicate the approach and compare findings in this thesis and other study populations of interest to future researchers. The next chapter presents and discusses the study results.

CHAPTER FIVE

RESULTS AND DISCUSSION

5.1 Chapter overview

This chapter presents, analyses, and discusses the study results. It further presents a statement of findings and a summary statement. The study objectives and hypothesis analysis follow a general description of the data gathered for the study. The results are then presented based on the study objectives. The first analysis and presentation of the results will explore the performance of theoretical underpinnings of a phonics-based approach to teaching reading within the context of implementation. Second, the discussion will focus on how well the pupils read in relation to the amount of early nutrition supplementation they received, as well as the associations between the pupil, household, and school resource endowment factors. Finally, the chapter presents a model with elements within the vector of factors that explain how pupils' reading ability varies. All tables in this chapter were computed and generated from the data collected during the study by the author.

5.2 Demographics of the study

The study involved 309 pupils (55% girls and 45% boys) from 292 households. The sex representation was drawn from the sampling and tracing of the available pupils from the sampling framework.

The pupils were enrolled in 17 primary schools. The variation in the number of pupils and households was due to the fact that the current study tracked pupils who participated in a nutrition supplementation study six years prior. In addition, some of the pupils had relocated due to factors such as loss of parents, adoption, and migration of parents. Data was collected from variables using multiple instruments. Table 5 below shows data split by age, gender, and grade level.

Table 5: Gender and grade of the pupils in the study

Gender	Standard						Total
	1	2	3	4	5	6	
Male	7	55	41	29	5	2	139
Female	4	44	66	49	7	0	170
Total	11	99	107	78	12	2	309

As shown in Table 5 above, 35 percent of the pupils were in Standard 3, followed by those in Standard 2 at 32 percent, and 25 percent were enrolled in standard 4. This meant that 92 percent of the sampled pupils had at least two years of education and, therefore, could attempt the levelled reading test administered. In addition, these findings indicated a high rate of class repetition; otherwise, in a perfect efficiency education model, the pupils would all be in Standard 5, based on their age range, since the official entry age for primary school is six (6) years. Girls enrolled in Standards 3-5 were more than boys at 62 percent, implying that there was more attrition of boys in the study area. Key informant interviews suggested that boys were involved in fishing chores by their parents resulting in school dropouts.

Table 6: Gender and age of pupils in the study

Gender	Age of Pupil					Total
	10	11	12	13	14	
Male	15	52	59	12	1	139
Female	31	75	54	9	1	170
Total	46	127	113	21	2	309

Table 6 above shows that 41 percent of the pupils were aged 11, while 37 percent were aged 12. Table 7 below shows the age split by standard in which the pupils were enrolled.

Table 7: Age split of pupils by Standard

Age of Pupil	Standard						Total
	1	2	3	4	5	6	
10	4	18	14	9	1	0	46
11	3	34	46	36	6	2	127
12	4	38	37	29	4	0	112
13	0	7	10	3	1	0	21
14	0	1	0	1	0	0	2
Total	11	98	107	78	12	2	308

Table 8 below presents the number of pupils traced during the study by the level of nutrition supplementation intensity they received, categorised by responses at household and individual pupil levels.

Table 8: Pupil respondents by nutrition intensity, household and pupil level

Intervention Group	Household-level		Pupil level	Percent
	N	Percent	N	
Group A	71	24	78	24
Group B	80	27	85	27
Group C	76	26	90	28
Group D	65	22	67	21

Groups A and D had the least number of pupils traced, while groups B and C had more. Overall, there was not a large difference in numbers of pupil per level of nutrition provided.

Table 9 below shows data collected from students regarding the frequency with which they are read to at home.

Table 9: Summary of responses from pupils by times they are read to at home

Times read to at home	Number of pupils	Percentage
Nobody reads to me at home	119	38
Once a day	89	28
Twice a day	66	21
Three times a day	27	9
More than three times a day	13	4

The response demographics above showed that 38 percent (119 pupils out of 309) of the pupils were never read to at home, while 62 percent of the pupils had access to a person who read to them at least once a day after school.

Table 10 below shows that 46 percent of the pupils that participated in the study came from households that did not have books to read, while 54 percent had access to at least one book and 17 percent of the pupils had access to more than two (2) books.

Table 10: Number of supplementary textbooks found at home

Supplementary textbooks	Number of pupils	Percentage
None	144	46
One book	37	12
Two books	79	25
More than two books	54	17

The demographics above showed that apart from the Chichewa and English textbooks that the pupils received in school, they had no additional reading resources with which to practise reading and improve their reading skills.

In addition to the textbooks that were found in homes, pupils were asked if they get books for reading practice from sources other than those found in their homes. The responses of the pupils showed that 51 percent (N=159) had no additional reading materials for after-school reading practice. A further 32 percent of the pupils (N=101) indicated that they get supplementary reading books from their teachers. In contrast, only 9 percent (N=27) of the pupils got books from libraries and classmates to practice reading after school, respectively. Table 11 below presents the demographic information.

Table 11: Reading books from libraries or peers for reading practice

Other sources of books	Number of pupils	Percentage
No where	159	51
Library	27	9

Further to the aforementioned factors, the study also collected information on the pupils' age, height, and head circumference. The data was collected to examine the average height for age and average head circumference for age to determine if the survey participants met the psychometric reference rates for nutrition for their ages. The reported mean age was 11, the mean height was 132 cm, and the mean head circumference was 51 cm. This shows that on the anthropometric scale, the pupils were relatively below their standard height for age, as the average height for age for boys

aged 11 years is 143cm cm and 145cm for girls and 50 cm for a five-year-old on head circumference (WHO, 2022), implying that the pupils' nutrition status remained on average lower than was expected post early nutrition supplementation, where it was expected that nutrition education provided to their parents would contribute to higher nutritional status. However, such a premise was dependent on the continued availability of the nutritious food, which was not the case with households in the study area. The demographic information is presented in Table 12.

Table 12: Pupils' average age, height, and head circumference

Variable	Units
Age	11.3 years
Height	132 cm
Head circumference	51 cm

In addition, the school resources survey showed that 50 percent of the pupils had access to libraries that were well stocked, well used, and had access to teaching materials. The remaining 50% of the respondents disagreed. The data from the responses were verified through observations conducted during data collection. The respondents and verification are shown in the data presented in Table 13.

Table 13: Data on selected variables on school resources

Item	Number of respondents applicable	Percent
The school library is well stocked	310	48.4
The library is well used by teachers and pupils	310	48.4
Teaching materials are adequate	307	54.1
Classroom has electricity	310	0.65

5.3 Discussion of results

The following subsection will present the results and accompanying discussion. Firstly, a discussion of results on whether pupils' mastery of prereading skills affects their ability to acquire reading fluency, followed by a discussion of the effect of early nutrition supplementation on the pupils' acquisition of early reading skills. The third subsection is a presentation and discussion of results regarding the association of individual physiological pupil factors that affect their reading ability followed by a similar presentation and discussion of results regarding household factors that also affect pupils' reading ability. This presentation will be followed by another discussion on how school resource endowment factors affect the acquisition of pupils' reading fluency. Finally, the key factors identified above as significant elements that contribute to pupils' reading ability will be discussed and modelled as the key factors that have the greatest influence on pupils' reading ability and complement reading instruction for pupils to acquire reading skills.

5.3.1 Association of pre-reading skills to reading fluency

The study examined the association between pupils' mastery of pre-reading skills and reading fluency. The purpose of the study was to determine whether pupils who had mastered the phonics-based reading instruction were better readers than those who had difficulties learning to read through the phonics-based instruction. The test was conducted through an analysis of variance from the reading scores in the pre-reading sub-tasks in the reading test and their association with oral reading fluency. The hypothesis tested to determine such an association was phrased as below:

H0 = Pre-reading skills do not predict the acquisition of reading skills and the ability to read early in life, and

H1 = Pre-reading skills predict the acquisition of reading skills and the ability to read early in life; H0 is the null hypothesis, and H1 is the alternate hypothesis.

The dependent variable in the hypothesis testing described above was the oral reading fluency as measured by the number of correct words read per minute. In contrast, the pre-reading skills scores of the pupils were the observable variables. The pre-reading skills or sub tasks in the reading test included letter knowledge, syllable reading, and familiar word reading. As indicated in Table 5.10 below, the analysis of variance showed that the statistical Fisher test was highly significant and the regression coefficients of the predictors were not equal to zero, indicating that there is sufficient evidence to reject the null hypothesis and that the study provides a rationale for doing so. This finding validated the alternate hypothesis that pre-reading skills predict the acquisition of reading fluency, hence mastery of phonics-based instruction had a positive effect on the ability of study participants to acquire reading skills.

Table 14: Phonics reading instruction hypothesis test results

	Number of Observations	310		R-squared	0.9638
	Root MSE (Explain)	11.34		Adj-squared	0.9133
Source	Partial SS	df	MS	f	Prob>F
Model	443103.79	180	2461.688	19.09	0
Familiar Word Read	81801.923	53	1543.432	11.97	0
Syllable reading	27210.096	65	418.6169	3.25	0
Letter Knowledge	19454.778	62	313.7867	2.43	0

The results presented in Table 14 above led to the conclusion that familiar word reading knowledge, syllable reading, and letter knowledge accurately predicts oral reading fluency. Pupils with stronger pre-reading abilities read more words from a given paragraph than pupils with weaker pre-reading abilities. This finding is further supported by the F-Statistic ($p=0$) and the observed R-squared (0.9638), implying that the findings are reliable and not a false result of peculiarities in the data set. This finding supports the importance of pre-reading skills in teaching reading through phonics instruction and predicts the fluency of pupils as noted by reading instruction theorists (Graaff et al., 2009; Torgerson et al., 2019; Woore, 2022).

The aforementioned results support that the phonics teaching approach is methodical and effective for pupils with stronger pre-reading skills. Furthermore, the study validated the practices and showed that the delivery of reading instruction to the pupils in the study followed the evidence of reading theory as postulated by other theorists on reading through phonics instruction (Palmer et al., 1985). This finding, therefore, supports positions advocated by scholars on behavioural reading theories, which assume that reading is learned procedurally. Further, they indicate that learning to read works well with reinforcing and scaffolding routines in the learners by the reading instructors; and that decoding letters, letter blends, and syllable blending leads to early success in the acquisition of reading skills (Freeman, 2004; Ertmer, 2013).

The pupils who participated in the research were from comparable linguistic, cultural, and geographical backgrounds. Therefore, the pupils had a probable similar schema in these respects. In this case, the cognitive theorists' assumptions that schema aids the

acquisition of reading skills (Clark, 2018; Guney & Al, 2012) would have held true and decreased the variance in the reading fluency scores for the pupils under the study. However, this was not the case, as there was marked variation and differentiation in the reading fluency scores. Similar assumptions raised by transactional reading theorists, namely that pupils learn to read through interaction with text and prior experiences (Forster & Rosenblatt, 1998) would have reduced the variance in fluency scores. However, this was also not the case. Therefore, without disputing the usefulness of cognitive and transactional reading theorists, the results indicate that acquiring reading skills at this early stage requires behavioural routines as a basis for learning to read. Once pupils internalise the patterns, they are able to decode words, including nonsense words. Notwithstanding other theories of reading, such as cognitivism and constructivism, which emphasise comprehension, this finding is relevant and useful for comprehension-related reading sub-tasks (Carlson, 1999; Clark, 2018; Lowenthal & Muth, 2008). Therefore, the behavioural aspect in phonics instruction needs complementing and blending with other reading theories for pupils to master reading and comprehend what they read. This phenomenon is despite the understanding herein that, firstly, phonics require that a pupil can read the word before meaning-making and comprehension processes. This finding explains why those who were able to name the letters, sound the letters, read syllables, and blend syllables into words had an easier time reading words in the paragraphs.

Regardless of the success in reading the words, comprehension remained low on average for fluent students since the test only allowed those who could read the paragraphs to proceed to the reading comprehension test. This finding suggests that the behaviourist phonics reading approach was significantly effective in teaching letter

decoding and word reading. However, it is limited in inculcating reading comprehension skills at this level, thus necessitating the application of other advanced reading theories such as constructivism and transactional theories of reading in integrating comprehension skills in the teaching of reading. It further enables the pupils to use prior knowledge, extend the text to non-textbooks and bring more titles to transact with the text in different contexts and make their meanings so that they can apply such strategies in reading comprehension tests. The initial finding supports the earlier position in the literature review that no singular reading theory should dominate a reading approach that informs a reading curriculum (Gourlay, 2003). Instead, strategies and assumptions that are levelled to the pupils and the independence of teachers and the pupils in instruction and meaning-making should direct applicable theories, not merely targeting fluency as was the case in this study.

In spite of the foregoing, it is evident from the findings of this study that the application of the phonics approach is not the only factor upon which a reading curriculum should be based. Other factors contribute to reading programmes having more sustainable outcomes. For instance, the analysis of variance and further review of the square root of the variance of the residuals (RMSE) in Table 13 above was high at 11.4. These results suggest that much as the pre-reading skills explain better oral reading fluency, other factors help pupils learn to read. The pre-reading skills cannot fully explain variation in scores on a test performed in oral reading fluency, thus agreeing with the literature, which shows that other factors such as pupil environment (Afoakwah & Koomson, 2021; Beluska-Turkan, 2019); household factors (Aram, et.al., 2013), and school resource availability (Adamba, 2018; Aas & Brandmo, 2016; Aina 2011; Akech, 2017) have been proven to affect pupils' learning abilities in addition to the reading

instruction. These factors earned ground for inclusion in this study to examine further those factors that affect the ability of pupils to learn to read in addition to reading instruction.

5.3.2 Effect of early nutrition supplementation on the ability of pupils to acquire reading skills

The study examined the relationship between oral reading fluency scores and early nutrition supplementation using the pupil performance examination of the study participants enrolled in various groups of early nutrition supplementation described previously. Variations in the nutrition intensity resulted from food items provided to the parents of the pupils; otherwise, all participating parents received standardised counselling on continuing to provide nutritious food to their children during and post-intervention. The seven-year follow-up of the study participants revealed that children who received high nutrition intensity performed better in their reading fluency test than the other groups in the standardised reading fluency test, as shown in Table 15.

Table 15: Pupils in reading fluency by nutrition supplementation group

Nutrition Intervention Group	Performance of pupils in reading fluency	
	Mean reading score	Number of pupils tested
A	40	77
B	26	83
C	29	86
D	30	64

As shown in Table 15, pupils in Group A had a mean score of 40 correct words per minute; Group B had a mean score of 26 correct words per minute; Group C and D had

29 and 30 mean reading scores, respectively. The coefficient variation for all groups was greater than one (1), indicating that there was notably less variation in the reading scores of pupils in Groups B, C, and D; although pupils in the lower group of nutrition intensity had higher scores than those in the intermediate groups of nutrition intensity. Overall, their performance was lower than that of the group with high early nutrition supplementation, indicating a positive relationship between access to better early nutrition and reading performance.

The reasons behind the variation in reading performance suggest that, besides early nutrition supplementation, other factors influence pupils' reading performance. Whereas it cannot be absolutely ascertained that better early nutrition in children leads to better reading performance in schools, the findings have shown that children with a high-level intensity of early nutrition were better readers than those who received a low-intensity nutrition package. This result suggests that the effects of early nutrition supplementation may have contributed to improved reading abilities of pupils who took the reading test. As such, supporting the finding that good early nutrition influences the growth and cognitive development of children. Therefore, it is easier for pupils with access to high-intensity nutrition at a young age to outperform those who have access to less intense nutrition.

The results described above were also observed in studies reviewed for this study (Baskale et al., 2009; Glewwe et.al., 2001; Howard, 2010; Nkhoma, et al., 2013). In each of these studies, it was found that nutrition has a positive impact on pupils' cognitive test performance. The findings of this study show that reading abilities and

acquisition of reading skills are also related to a pupil's nutritional status. As stated previously, the high variation in data scores within each group suggests that other factors in the environment where these pupils live affect how well they perform in reading tests. Therefore, this was incorporated into the study, with the knowledge that regardless of early nutrition supplementation, the pupils grew up in different environments, had varying levels of household endowment, and attended schools with varying access to learning-enhancing school resources. These are the factors that often are frequently absent from reading programmes. For the case under study, it is clear that the reading approach is dominant in instruction support scripted to support implementation fidelity across implementers. It assumes that all other contextual factors will fall in place with the external backing – an assumption that the study interrogated and found not holding as described below.

5.3.3 Association of pupil physiology and access to learning resources regarding their ability to acquire reading skills.

The study investigated the impact of pupils' height, head circumference, absence from school, pre-school attendance, reading practice, frequency of reading practice, and early nutrition received on their reading ability. These variables were observed during the study. However, latent variables were identified to explain the behaviour of some of the observed variables. These latent variables included pupil bullying and the number of meals pupils indicated to have taken in a day reported by pupils during interviews. In addition, the latent variables revealed a negative relationship between school attendance and student bullying.

Furthermore, the more a pupil was bullied, the more often he or she missed school. Similarly, it was noted that regardless of the early nutrition intensity a pupil received, continued uptake of food post-intervention affected the nutrition status of the pupils. Therefore, the number of meals a pupil took in a day was assumed to have a positive linkage to the nutrition status of a pupil at the time of the study.

A path analysis was performed and thereafter developed a generalised structural equation modelling associating pupil height, pupil head circumference, absence from school, and level of nutrition supplementation intensity received in their earlier years with reading fluency scores from the reading test. In addition, other elements in the pupil factor vector included pre-school attendance, the ability to practice reading after school, and the frequency with which someone read to the pupil at home. Furthermore, the number of meals a pupil took in a day was a latent variable for height and head circumference, whereas exposure to bullying predicted school attendance as a latent variable explaining the association between consistent school attendance and the reading fluency scores that a pupil scored during the reading test administered in the study survey. The results are presented in Table 16 below.

Table 16: Generalised structural equation modeling results for pupil factors

Log likelihood = (6205.8994)

Variable	Coef.	Std. Err.	z	P> z 	[95% Conf. Interval]	
Pupil Reading performance (z_mscore)						
Pupil Height	0.0052	0.0034	1.52	0.1278	-0.0015	0.0119
Pupil head circumference	-0.0046	0.0073	-0.62	0.5344	-0.0189	0.0098
Pupil absence from school	-0.1*	0.0361	-2.77	0.0056	-0.1707	-0.0293
Pupil level of nutrition intensity at early age	-0.0899	0.0507	-1.77	0.076	-0.1892	0.0094
Pupil pre-school attendance	-0.0498	0.1074	-0.46	0.6431	-0.2602	0.1607
Pupil reading practice	0.5553***	0.1384	4.01	0.0001	0.2841	0.8265
Times a pupil is read to at home	0.1097**	0.0498	2.2	0.02	0.0122	0.2073
Constant error term	-0.5189	0.4499	-1.15	0.2488	-1.4006	0.3629
Pupil Height						
Number of meals a pupil takes per day	1.0000 (constrained)					
Constant error term	132.2167	1.1561	114.37	-	129.9508	134.4825
Pupil head circumference						
Number of meals a pupil takes per day	0.7686	0.5222	1.47	0.1411	-0.2549	1.7921
Constant	51.1877	0.5372	95.29	0***	50.1349	52.2406
Pupil absence from school						
Pupil bullying in school	1.0000 (constrained)					
Constant	2.6881	0.0866	31.03	0	2.5183	2.8579

Variable	Coef.	Std. Err.	z	P> z 	[95% Conf. Interval]
Variance of Meal (Multi-level latent)	52.8801	79.134 7			2.8150 993.3662
Variance of Pupil bullying in schools	0.5397	0.7733			0.0325 8.9511
var(e.z_ms~e)- Pupil performance in reading	0.843	0.0696			0.7170 0.9912
var(e.Hei)- Pupil height	365.4364	29.991			311.1390 429.2092
var(e.Hec)- Pupil head circumference	77.9539	6.4002			66.3670 91.5637
var(e.absent)- Pupil school absence	2.2634	0.1916			1.9173 2.6720

A confirmatory analysis of factor loadings indicated a significant association between pupil bullying and absenteeism (0.54) among the affected pupils. A unit change in pupil absence negatively affected the ability of pupils to read by a factor of 0.11. Similarly, a unit change in places where pupils read had a negative factor of 0.074, affecting the ability of pupils to read. This finding supports earlier studies that linked bullying to increased pupil school absenteeism, decreased time on task and fewer contact hours with teachers and peers, resulting in poor learning outcomes (Roby, 2004; NCES, 2009).

However, the number of meals taken per day did not significantly explain the height or head circumference of pupils. There was also no variation in meals taken per day against the level of intensity in early nutrition (probability of .037), implying that this linkage was not established, supporting that the pupils who participated in the study had access to similar food items with similar frequency, therefore the homogeneity experienced could not independently describe the effect of nutrition on the pupils' reading abilities. Furthermore, the study supported that remediation through food uptake later in life has a negligible impact on one's nutrition (Glewwe, et.al., 2001). However, regardless of these results, pupils with access to a higher nutrition intensity performed better in reading tests than others, as was shown earlier in this study, hence the conclusion that nutrition intensity at an early age was positively correlated with reading performance and that this correlation is not robustly affected by variations in food uptake later in life.

However, a unit change in pupils' height positively affected pupils' ability to read by a factor of 0.006. However, the coefficient of height was found statistically insignificant ($p= 0.1278$). This finding contradicted earlier studies that found a positive association between nutrition and height, and, by extension, cognitive ability and better acquisition of reading skills (McGregor et al., 1997). This correlation may result from the lower height variation among the study's sampled pupils; consequently, they are expected to perform within a reasonable range on the test scores within each category of nutritional supplementation. However, the study's findings are consistent with those of other studies in which no significant variation in height was found among the pupils who participated in the early nutrition intervention (Galpin, et al., 2007). This finding implied that early nutrition supplementation for the pupils enrolled in the intervention did not result in significant height differences between groups. Notably, seven years later, the variation in height among the pupils traced for this study remained minimal. Therefore, despite the hint of the positive effect noted above, the height variable could not independently explain the differences in reading scores obtained by the pupils in this study.

However, a unit change in early nutrition intensity grouping negatively affected the ability of pupils to read by a factor of -0.087. The coefficient of nutrition intensity group was found significant at a level of 10% ($p=.076$). This finding implied that any change to a lower level of nutrition intensity supplementation decreased the pupils' reading performance. In the study, the head circumference did not matter. There was a factorial change of 0.007 in reading performance for every unit change in the head circumference of pupils. However, this change was statistically insignificant in expressing changes in pupils' reading ability ($p=.5344$). This finding implied that what

significantly explained the variation in reading ability was the level of nutrition intensity each pupil accessed early in life and not how well the pupil grew after the nutrition intervention. This also suggested that it is difficult to improve nutrition after early interventions, as significant differences in height were observed during the early nutrition food supplementation intervention. Similarly, there were no height or age differences among the pupils measured seven years after the food supplementation intervention. This finding implied that no significant variations in reading fluency scores were expected between the groups of pupils that participated in the four nutrition supplementation groups described earlier.

In addition, it was observed that pupils' reading fluency was reduced by a factor of 0.024 due to their lack of nursery school enrolment. However, the coefficient for pre-school attendance was statistically insignificant ($p = .6431$). This was the case mainly because not as many pupils attended preschool in the study area. Therefore, the findings do not in any way discount the importance of preschool in developing reading skills in pupils (Aram, et al., 2013). However, this finding was not supported in this study because of homogeneity in pupil responses and experiences with preschool.

For every unit change in the number of times a pupil is read to during reading homework, the pupil's reading ability increased by a factor of 0.21. The coefficient of the for the reading homework was found significant at 5% ($p=.0275$), implying that pupils in the study read well when someone read to and with them. Similarly, pupils who practised reading after school improved their reading ability by a factor of 0.53, the coefficient of reading practice was found statistically significant at 5% ($p=.0001$). This finding implies that pupils improved their reading skills due to increased effort

spent practising reading and classroom instruction. These findings supported that, in addition to reading instruction, reading practice and access to multiple reading titles of supplementary readers help pupils acquire reading skills more rapidly than without them, as supported in earlier studies (Bretton, 2018). Therefore, for pupils to learn to read at a younger age, curriculum delivery must incorporate nutrition, reading practice, and supplementary textbooks and reading titles that foster a culture of reading practice that encourage pupils to read for pleasure and improves their reading fluency and comprehension of the content read.

5.3.4 Association of household factors that affect pupil's ability to learn reading

The study found that the availability of books that are not textbooks provided by schools as part of the reading instruction curriculum in the home contributed to the ability of pupils to learn reading by a factor of 0.2, the coefficient of the factor on supplementary reading materials was at 5% significance level ($p= 0$). This finding implied that, in the vector of factors that affect the ability of a pupil to learn to read, the availability of reading materials other than school textbooks in the pupils' homes significantly explains why, all else being equal, pupils' reading scores varied. A similar analysis on sources of books rented in homes by parents for pupils to practise reading, the suitability of places where a pupil practised reading when at home, and the gender of the household member that assisted the pupil in practising reading at home revealed no statistical insignificance. These findings withstanding, it does not mean that the factors cannot explain variability in reading scores for the pupils; however, it shows that in this study, the pupils came from largely homogenous household contexts, so

they could not explain any variation in pupil performance. The evaluation results of the household factors included in the study are summarised in Table 17.

Table 17: Results of the structural analysis of household factors that affect the ability of pupils to learn reading

Log likelihood = -1517.7215

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
Pupils reading performance					
Books available in homes that are not textbooks***	0.197048	0.056101	3.51	0	.0870923 .3070027
Books available in households rented from other sources	-0.04491	0.063068	-0.71	0.476	-.1685177 .078703
Places where students practice reading in households	-0.04964	0.068718	-0.72	0.47	-.184323 .0850448
Gender	-0.13564	0.195926	-0.69	0.489	-.5196526 .2483634
Books available in homes that are not textbooks					
Persons reading to pupils in households	1	constrained			
Error term	1.418239	0.224407	6.32 0.000	0	.97841 1.858068
Books available in homes that are not textbooks					
Persons reading to pupils in households	1	(constrained)			
Error term	1.418239	0.224407	6.32	0	.97841 1.858068
Books available in households rented from other sources					

	Coef.	Std. Err.	z	P> z 	[95% Conf. Interval]
Persons reading to pupils in households	0.855346	0.173113	4.94	0	.5160517 1.194641
Error term	1.233944	0.196481	6.28	0	.848849 1.619039
Gender					
Persons reading to pupils in households	0.065863	0.065995	1	0.318	-.063484 .1952106
Constant	1.565998	0.037892	41.33	0	1.491731 1.640264
Variance (M1[who_read]- Persond reading to pupils in hosueholds]	0.23871	0.171585			.058348 .9765935
Var (e.z_mscore) - Pupils reading performance	0.962548	0.079661			.8184203 1.132057
Var (e.Books_nt_txbk) - Books available in homes that are not textbooks	1.150005	0.09378			.9801366 1.349312
Var (e.oth_sour_bks)- Books available in households rented from other sources	1.009351	0.082274			.8603179 1.184201
Var (e.Gender)- Gender of pupils	0.253789	0.020971			.2158426 .2984067

5.3.5 Association of school resources with the ability of pupils to read

The study examined the impact of school resources on pupils' ability to learn to read. Variables included in the study were teachers' support for pupil development, adequacy of teaching materials, use of library resources at the school, and classroom space for both pupils and teachers. The study also examined latent variables that influenced the observed variables in determining the pupils' reading abilities. The study examined the relationship between the availability of a school library and its utilisation, the distribution of textbooks in schools to determine the adequacy of teaching materials, and the friendliness of school staff toward pupils to support the development of the pupils' reading skills.

Path analysis revealed that there is a direct correlation between the availability of school libraries and their utilisation. The same holds true for textbooks that were distributed in schools to the assertion of empirical adequacy of materials in schools, as well as for staff that was friendly to pupils could nurture pupils' learning ability and growth with ease. Otherwise, the availability of classroom space significantly predicted pupil reading performance; for every unit change in the classroom space availability, reading performance improved by a factor of 0.58. This finding may be due to the fact that classrooms with fewer pupils have sufficient space for teachers to move around and monitor each pupil's performance as they go through the teaching routines of reading using a phonics-based approach. Therefore, closely monitored pupils receive immediate feedback for continuous learning and subsequently improve their reading performance. At the same time, a unit change in staff support for reading instruction led to a 0.37-factor shift in the reading performance of the pupils, all variables held

constant. Similarly, a unit change in the unavailability of learning materials led to a reduction in reading performance by a factor of -0.18. Finally, the underutilisation of the library resources led to a reduced reading performance on oral reading fluency by a factor of -0.17.

Notwithstanding the factor loads identified in the preceding path analysis, the observed variables were subjected to a statistical significance test using generalised structural equation modelling. This procedure was conducted to determine which of the aforementioned factors statistically explains the variation in pupils' ability to learn to read. Results showed that the coefficient of the availability of classroom space was statistically significant at 10% significance level ($p=.062$). The other variables, such as the variety of reading materials in classrooms and libraries and their utilisation, adequacy of teaching materials, and teacher support provided to pupils in reading practice, were statistically insignificant, as shown in Table 18 below. These results contradict previous research that identified such variables as crucial for reading instruction (Day, 2018; Gurr, 2015; Llomo & Mlavi, 2016; Hanushek, 1997). Therefore, according to the present study's findings, the variables do not in any way indicate that they are not significant in explaining the variation in pupils' reading fluency scores. However, the response from survey participants was uniform. Therefore, regardless of the findings, further academic inquiry on surveys with variation in responses to the aforementioned factors may result in different conclusions, making this an area of interest for further studies, including consideration in the modelling and design of reading intervention programmes where such variation exists.

Table 18: Results from a generalised structural regression analysis of school factors affecting pupils' reading ability.

Variable	Coefficient	Standard Error	z	P> z 	[95% Conf. Interval]
Pupil reading performance <-					
Teachers and head teachers support pupil development	0.3681339	0.2781388	1.32	0.186	-.1770081 .9132759
School has adequate teaching materials	-0.2022583	0.1631871	-1.24	0.215	-.5220992 .1175826
Pupils and teachers use the library well	-0.1676631	0.1753112	-0.96	0.339	-.5112668 .1759406
Classes has enough space for pupils and teachers*	0.582841	0.3124538	1.87	0.062	-.0295572 1.195239
Classrooms have a variety of reading materials	-0.1784321	0.1835112	-0.97	0.331	-.5381075 .1812433
Constant (Error Term)	0.1752774	0.0888117	1.97	0.048	.0012096 .3493452

Table 18 demonstrates that the more space pupils have in the classroom, the more likely they are to receive effective instruction and immediate remediation, resulting in improved learning outcomes. This finding implied that regardless of which theories of reading form the basis of a reading intervention or approach, adequate space and a manageable pupil-to-teacher ratio are necessary to maximise pupils' performance in acquiring reading skills. The findings above showed that the support teachers provide to pupils in their learning to read, the availability of various reading materials, and the utilisation of libraries are less influential in developing reading skills. Especially in situations where they are available or unavailable to all pupils, they will not be the cause of the associated variation. This withstanding, it must be noted that these factors were rarely available in the study; therefore, every pupil had the same exposure. Therefore, the study cannot conclusively state that these factors are less influential in explaining variation in the ability of pupils to acquire reading skills. It remains an area that requires further academic inquiry to complement theory or inform practices in teaching reading.

5.3.6 Modelling of key complementary elements to reading instruction in the teaching of reading

The study analysed pupil, household, and school resource factors for granular elements influencing pupils' ability to learn to read. The elements that significantly affect pupils' ability to learn to read included the nutrition intensity they had access to during their early years (0-36 months). In addition, class absenteeism, alternative literature found in households besides curriculum textbooks, access to reading homework, the frequency with which pupils practise reading, and effective utilisation of library resources and classroom space significantly explained variation in pupils' abilities to

acquire reading skills. Therefore, the study collectively examined the path of these variables to determine the extent to which they explained variations in reading fluency scores and which of these variables would serve as models for teaching reading-related factors. The path analysis results for these critical factors using generalised structural equation modelling are presented in Figure 5.1 below.

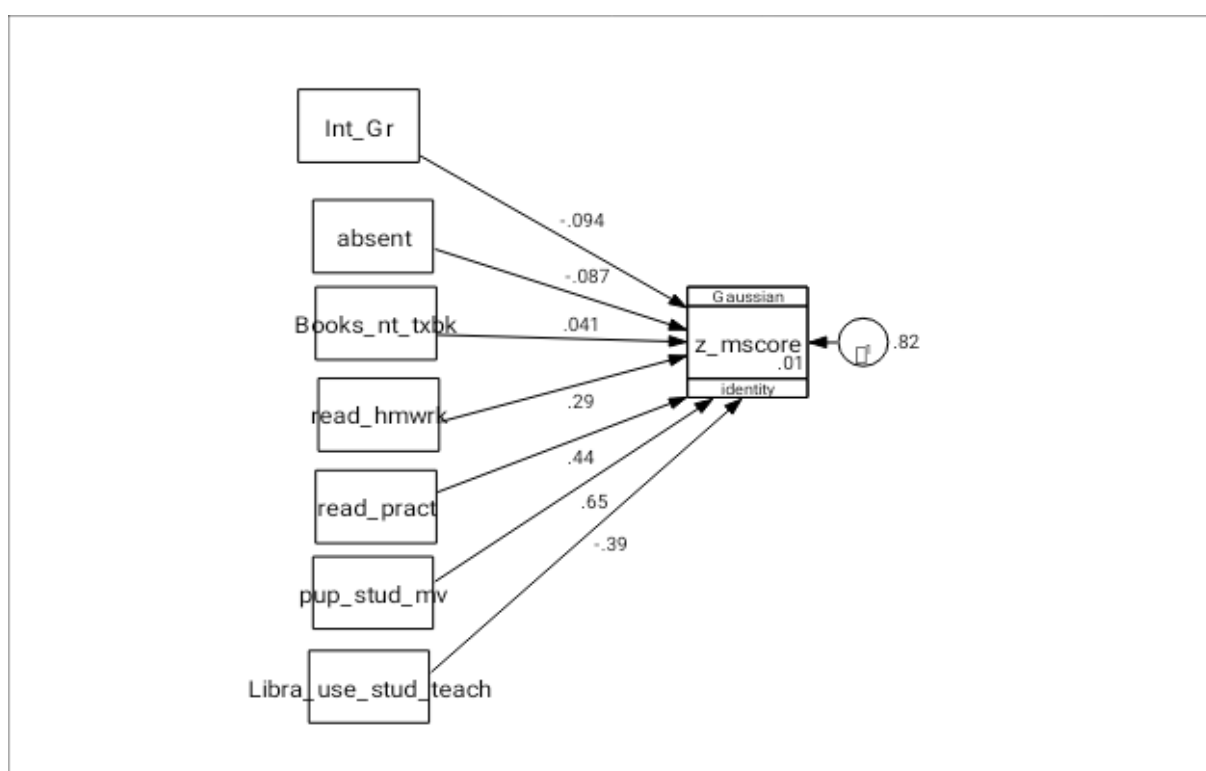


Figure 10: Path analysis for modelling teaching of reading

The results of the path analysis depicted in Figure 10 indicated that classroom space significantly affected the ability of pupils to learn to read. Notably, a unit change in classroom space resulted in a 0.65 factor increase in pupils' ability to learn to read, supporting the effect of class size on learning outcomes (Llomo & Mlavi, 2016). Notably, this is a factor that reading theorists rarely emphasise. In low-resourced

countries with a pupil-teacher ratio greater than 1:60, it is understandable that reading theories would not be applicable. Therefore, context-adaptation is necessary for theory-based reading programmes to ensure that both the teaching practises and the environment of the students and teachers are compatible. A reading curriculum must take into consideration the assumptions and provisions that complement the reading theories. Nothing resolves itself in the absence of sufficient resources, and interventions based on proven approaches often fail to produce desired results.

Similarly, schools that did not utilise their libraries decreased pupils' reading ability by a factor of 0.39 per unit change. In addition, any unit change in reading practice increased the pupils reading fluency scores by a factor of 0.44. Finally, everything else held constant; pupils who had reading homework improved their reading abilities by a factor of 0.29. Thus, the aforementioned findings attest that in addition to the emphasis on reading instruction and its theoretical foundation, school resources and reading practice with various titles are essential and complement reading instruction by means of affectionate reading practice. Furthermore, this allows pupils to interact with more text and build vocabulary and comprehension skills for meaning-making on words they read in a textbook.

As shown in Figure 5.1 above, unit changes in the availability of books other than textbooks in households, school absence, and nutrition intensity provided to the pupil at a young age had a negligible effect. The influence of unit changes in both factors on pupils' reading ability was 0.09-factor. However, the factor loadings for the level of nutrition intensity received early in life for pupils were significant at $p=.056$, supporting that early nutrition affects the ability to acquire reading skills and complements other

factors, such as reading instruction in an effort to teach pupils to read early in their studies (Glewwe et al., 2001).

The study also found a marginal effect of absenteeism on the ability of pupils to learn to read ($p=.013$), supporting that absenteeism causes students to miss out on routines enshrined in scripted reading instruction and repeated routines advanced in behavioural-based phonics reading approaches. This phenomenon disadvantages structured learning routines, and as a result, pupils who are consistently absent from school cannot fairly compete with those who consistently attend lessons and routines.

Therefore, it is apparent that the emphasis on phonics-based reading approaches in reading instruction must be well balanced. This approach must be accompanied by deliberate interventions designed to reduce absenteeism by preventing school bullying, reducing pupil morbidity and procrastination that causes pupils to miss lessons. Unfortunately, these social aspects are not typically discussed in conjunction with reading theories or incorporated into the development of reading instruction approaches. This tendency reduces the effectiveness of reading interventions that would otherwise result in improved reading skills acquisition.

Table 19 below shows that well-utilized school library resources explain the range of pupil reading abilities. Holding all other factors constant, a unit change in the underutilisation of library resources reduced the ability of pupils to read by a factor of 0.39, the coefficient of the factor on well utilised library was statistically significant at 5% significance level ($p= 0$). Similarly, the coefficient of classroom space availability was statistically significant at 5% significance level ($p= .029$). All else being equal, a unit change in classroom availability resulted in a 0.64-factor change in pupils' ability

to learn to read. The same was found for pupils who practised reading after school; the coefficient on this variable was significant at 5% significance level ($p=.013$). Finally, a unit change in practising reading in households led to a change in reading abilities by a factor of 0.44, the coefficient of this variable was statistically significant at 5% ($p=0$). Notably, some earlier factors influencing pupils' reading ability were not statistically significant at a 5% confidence interval. For instance, the coefficient of the variable on pupils with homework read was statistically insignificant at 5% significance level ($p=.108$). However, the coefficient was significant at 10% significance level with a factor load of 0.28 on their reading abilities. This implied that in this instance, assigning homework to the pupils did not explain why some pupils read better than others.

Similarly, the coefficient on the variable on the availability of books was statistically insignificant ($p=.383$), at both 5% and 10% significance level. This finding does not imply that these factors do not explain or influence reading ability variance among pupils. However, in this study, there were no critical determinants of pupils' ability to learn to read, when other factors were considered. Notable is the fact that the reading intervention based on the case study focused efforts on providing textbooks and classroom instruction. In contrast, the study showed that utilisation of libraries, reading practice, and smaller class sizes were critical determinants of pupils' ability to acquire reading skills. Therefore, emphasis must be placed on enhancing the quality of reading instruction and the textbooks and other supplementary readers to which the pupils have access. This essentially necessitates a multi-approach when dealing with theory- and evidence-based interventions that lack close alignment and application to the context in which they will be implemented.

Table 19: Results of structural analysis of critical pupil, household, and school factors affecting pupil reading abilities

Log likelihood = - 401.19669

Variable	Coef.	Std. Err.	Z	P> z	[95% Conf. Interval]
z_mscore <-					
Int_Gr **	-0.0938	0.049	-1.91	0.056	-0.1899636 0.0023635
Absent***	-0.0874036	0.035	-2.48	0.013	-0.1565325 -0.0182746
Books_nt_txbk	0.0411079	0.047	0.87	0.383	-0.0513316 0.1335475
read_hmwrk*	0.2861164	0.178	1.61	0.108	-0.0628237 0.6350566
read_pract**	0.4361657	0.175	2.48	0.013	0.0913108 0.7810207
pup_stud_mv**	0.6461267	0.295	2.19	0.029	0.0667524 1.225501
Libra_use_stud_teach***	-0.3923047	0.106	-3.69	0.000	-0.6005894 -0.1840201
_cons	0.0102618	0.223	0.05	0.963	-0.4274122 0.4479358
var(e.z_mscore)	0.8200212	0.0665125			0.6994932 0.961317

5.4 Conclusion

In conclusion, the study found out that in addition to the design and implementation of theories behind the phonics approach to the teaching of reading and its emphasis on teaching instruction, the context and support that pupils get on learning to read has a more significant impact on the pupils' performance in reading. In particular, the study area and population showed that learning environment, use and utilization of libraries, reading practice (after school), consistent presence and participation in reading lessons by pupils, nutrition status and reading homework provided by teachers for pupils to attend to would have made a big difference on the ability of pupils to learn to read. Therefore, investments in a reading approach needed to have gone beyond reading instruction and provision of text, rather leveraging investments in the contextual factors noted above.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND IMPLICATIONS

6.1 Summary statement of the study

The study supported the hypothesis that teaching reading through a phonics-based approach improves pupils' reading fluency in early grades. Pupils with good scores in pre-reading test items such as letter naming, syllable reading, and familiar word reading performed well on the reading fluency test. This finding justifies the focus by programmers of reading interventions on phonics-based instruction and investments to have teachers focus on teaching reading approaches for better reading outcomes.

However, the phonics approach is not the only significant focus that should have a fair share of investment value, as the context in which such investments are made must be studied and incorporated into the investment decisions that serve as the basis for the financing of such programmes. The study has further shown a positive association between the effects of the pupil, school, and household factors on the pupil's ability to acquire reading skills. The study has further illustrated that early nutrition supplementation in children affects reading abilities later in life. For example, the mean reading scores for pupils who received high-intensity nutrition supplementation were higher than those who received lower-intensity nutrition supplementation.

Furthermore, the study has found that in addition to teaching reading instruction, factors such as consistent classroom attendance, reading practice after school, the availability of adequate classroom space, and the utilisation of library resources significantly explain the variance in students' ability to learn how to read. Thus, reading programs must be developed with the hindsight of these complementary factors for sustainable reading gains.

The results from the study presented and discussed in the preceding section demonstrate that the reading programmes followed an instruction approach (phonics) that helps pupils read more quickly and is consistent with the literature on reading theory. However, the results question the exclusion of factors that supplement the acquisition of reading skills described above and reading comprehension strategies based on other reading theories, such as cognitive, constructivism, and transactionism theories. Once the pupils are eminent readers, these high-end reading theories show that the instruction approaches cannot uniquely lead to better results without integrating and complementing the strategies and assumptions behind the theories.

The findings of this study provide a model for generating evidence that can unearth contextual factors that influence reading fluency and comprehension scores. Furthermore, the study's context analysis provides evidence pointing to theories and practical elements at the pupil, household, and school levels that must be considered when modelling literature on reading instruction that enables pupils to acquire reading skills.

6.2 Study conclusions

The study concludes that pupils who are first taught familiar words from their environment, and are taught syllable reading and letter knowledge have higher reading test scores and above-average oral reading fluency. This finding supports that the acquisition of pre-reading skills is essential for pupils to learn to read in the early grades of primary education (standards 1-4).

Secondly, the study found that early nutrition supplementation affects the growth and cognitive development of pupils, which has a direct impact on their performance on reading tests, therefore, early nutrition influences the ability to acquire reading skills and complements other factors, such as reading instruction.

Thirdly, factors that are unique to the pupils and their experiences influence their performance in learning to read. These factors include the following:

- i) **Pupil bullying:** Schools where bullying occurs have a higher rate of pupil absenteeism. The structured and sequenced reading lessons in the phonics-based approach to teaching reading require that pupils consistently attend lessons. Therefore, schools with bullying had pupils with lower reading scores than schools without or fewer instances of bullying. Therefore, school bullying negatively affected the reading performance of pupils in the study.
- ii) **Places where pupils practise reading:** The study found that differences in places where pupils practised reading had no effect on the pupils' ability to learn to read.

iii) Number of meals taken by pupils in a day: The study found that there was no correlation between the number of meals a pupil took in a day and the pupil's ability to learn to read, reflecting the fact that there is no nutritional remediation after the first 36 months of a pupil's life. Consequently, post-nutrition supplementation had little effect on the cognitive ability of pupils and, by extension, their ability to read.

iv) Height of pupil and ability to learn reading: The study found no correlation between the height of the pupils and their ability to read. This is the case despite the fact that pupil height is correlated with nutritional status, with the assumption being that taller pupils have better nutritional status and are therefore expected to have better cognitive skills that aid in the learning process and, consequently, better reading abilities.

V) Classroom space/ size: The study found a correlation between classroom space and pupils' reading ability. The study observed that reading abilities increase with availability of space in classrooms, therefore, regardless of the fidelity of the reading instruction, schools with a lower pupil-to-classroom ratio had students who acquired reading skills faster than those with a higher pupil-to-classroom ratio.

Fourthly, the study found that household-specific factors contribute to the preparation and readiness of the pupil to learn to read regardless of the quality of instruction received. In particular, the study found that the availability of supplementary reading materials in households provided the pupils with additional text for reading practice and subject-based texts that they received from school. Pupils with access to supplementary reading titles had higher reading test scores than those without access to supplementary reading materials.

Fourthly, the study found that school resources affect how pupils acquire reading skills. In particular, the following factors were identified as very significant in explaining how pupils learn to read.

- i) **Teacher Support:** The study found that teaching support to pupils' learning of reading resulted in a shift in the reading performance of the pupils. Therefore, it is hypothesised that in schools where instructional leadership and peer support were emphasised, pupils acquired reading skills faster than in schools with no established systemic structure to support teachers in reading instruction.
- ii) **Learning Materials:** The study found that the unavailability of learning materials decreased reading performance. This result implied that schools with more learning materials had better reading outcomes than those with fewer.
- iii) **Library resources:** The study found that underutilisation of library resources resulted in a reduction in reading performance. This result implied that schools where library resources, including supplementary reading titles, were utilised by pupils read better than pupils in those schools without library resources or where library resources were underutilised.

6.3 Implications of the results

The study results have the following possible implications:

- i) **Reading curriculum design and implementation:** The study results indicate that several factors contribute to pupils' capacity to learn to read. These factors show that in addition to focusing on reading instruction and its implementation fidelity, curriculum planners and developers must contextualise the curriculum based on the pupils' existing circumstances. For instance, the study has established that a higher pupil-to-classroom ratio hinders the delivery of the

reading curricula. Given the high pupil-to-classroom ratio, designing a reading curriculum with this knowledge will necessitate adjusting the reading instruction routines to be less labour intensive since teachers cannot handle such scripted routines. In addition, the results of the study indicate that pupil bullying in schools reduces pupil attendance; thus, pupils do not consistently attend and participate in school. While the reading curricula may not focus on reducing bullying in schools, it is likely that pupils in such schools will require a lot of remedial lessons. The expectation is that the reading curricula will integrate remedial lessons and ensure that lesson progression does not impede pupils' ability to recover when they miss a lesson.

ii) Reading curriculum delivery: The study has shown that successful delivery of a reading instruction requires attention to the pupil's context. It is evident from the findings that much progress in reading gains would be delivered if investments are made in the early nutrition of the pupils. In essence, concerted efforts in building a young population that is well-nourished and supplemented in the first 1000 days of a pupil's life have the potential to produce pupils with well-developed cognitive abilities who can comfortably handle reading instruction and acquire reading skills more quickly. Without a focus on cognitive ability and early nutrition supplementation, the reading scores for the pupils are likely to remain low and poor.

iii) Complementary aspects to the acquisition of reading skills: The study found that reading practice and the availability of supplementary reading titles in the homes of the pupils are crucial for the development of reading skills. A notable implication at this time is that, in addition to classroom reading instruction, the home environment should be improved so that it is conducive for pupils to

practice reading, including the deliberate provision of supplementary reading materials. Therefore, in addition to the reading instruction, curriculum developers should develop levelled reading materials that are age-appropriate and can be used in households with the coordination of the responsible household heads. Therefore, the reading curriculum should be designed beyond the classroom and provide sustained reading practice so pupils can continue developing their reading skills outside of school. Further to this, there is a need for a deliberate attempt to introduce reading boxes in each classroom. This should encourage teachers to promote a culture of borrowing books among pupils for reading practice with additional supplementary readers. The inability of households to provide additional reading materials for their wards hinders pupils from developing an interest in reading for pleasure. Therefore, the delivery of a reading curriculum necessitates investing in library resources that pupils can borrow and use to practise reading in their own time. It is clear that learning to read is greatly complemented by a pupil's ability to practice reading.

iv) Community focused reading interventions: The study found that the reading curricula are structured in a progressive manner, with subsequent lessons building on previous learning outcomes. As such, consistent classroom attendance is critical to ensure that pupils follow through with the lessons. Therefore, the issue of bullying resulting in a low rate of pupil attendance must continue to be addressed through community engagements to ensure that pupils consistently attend classes. This will enhance the delivery of the reading curricula. Where this is not possible, the reading curriculum design should reflect the aforementioned challenges and ensure that teachers spend a significant amount of time on reading instructions remediation, enabling pupils to catch up on the reading curriculum

requirements they would have otherwise missed due to inconsistent class attendance.

v) **Policy, planning and education programming:**

Results of the study show a vector of factors modelled as a bare minimum key aspects of a reading programme. It is apparent that most of the factors in the model happen outside the school, therefore, these factors require integrating into the reading programmes together with commensurate financing. The model has supported the following factors as key to facilitating that pupil read early and at reasonable thresholds: Nutrition status of the pupils, availability of supplementary reading materials, well utilised school/ community libraries, conducive reading practice space for pupils in homes, frequency of reading practice, consistent school attendance, and provision of reading homeworks for pupils, and the pupil learning environment at school. Therefore, much as theory attest and emphasise on reading instruction, these attendant factors explain the variability in pupil reading scores, and if attention and investments are made on these contextual factors, reading instruction will be supplemented, hence better pupil reading performance.

6.4 Implications for future research

The study results have opened up several areas that require further research related to the topics under the study. These areas are noted and described below.

- i) **Variation in pupil height and correlated effect on the ability to acquire reading skills:** The study found that a unit change in pupils' height positively affected the ability of pupils to read by a factor of 0.006 ($p=.1278$). However,

this was determined to be statistically insignificant. This finding contradicts earlier research that found a correlation between height and nutrition and, by extension, better cognitive ability (Baskale, et al., 2009). However, there was a slight variation in height among the collected data, which may have affected the results. No significant variation in the height of the study subjects was observed in earlier studies on monitoring growth from nutritional supplementation that were also conducted in the study area (Phuka, Thakwalakwa, Maleta, Cheung, Briend, Manary & Ashorn, 2009).

However, it will be exciting to conduct research in this area, where nutrition supplementation studies have revealed a correlation between pupil height and nutrition supplementation levels. This will support that height variation among pupils is associated with their nutritional status and, by extension, their cognitive ability, as well as the resulting hypothesis that pupils with greater height will achieve higher reading scores on a standardised and levelled reading test.

ii) Effect of preschool on the acquisition of reading skills for pupils in Standards

1-4: The study found that with non-attendance of nursery school decreased reading ability by a factor of 0.024. However, this was statistically insignificant ($p=.6431$). This finding contradicted earlier findings that have shown a positive correlation between preschool attendance and learning outcomes in early primary education (Aram, et al., 2013). However, none of the pupils in the study population attended preschool. This limited variation affected the homogeneity of the study response. More effort in researching this concept would be helpful in a heterogeneous study environment. If conducted, this could motivate investments in preschool to enable reading score performance.

iii) **Effect of reading homework and availability of reading titles in pupils'**

homes. The study found that students who had homework, despite affecting a factor load of 0.28 on pupils' reading abilities, were statistically insignificant ($p=0.108$). Similarly, the availability of books was insignificant statistically ($p=0.383$). While these findings are valid for the study population, they do not conclusively demonstrate that such factors have a lesser impact on pupils' reading ability. Therefore, further research is required to increase subject variability and support the results, probably with a large study sample. Such an investigation will have policy implications that may guide the implementation of reading curricula in the near future.

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APPENDICES

Appendix 1: Reading test

Malangizo:

Muyenera kukhazikitsa ubwenzi wabwino ndi wophunzira amene mukumuyesa kudzera mu nkhani zifupizifupi komanso zosangalatsa kuti aone mafunsowa ngati sewero chabe osati ntchito yovuta. Nkoyenera kuwerenga zigawo zokhazo zomwe zili mumabokosi mokweza, momveka bwino ndi modekha.

Uli bwanji? Dzina langa ndi_____ndipo ndimakhala ku _____. (Chezani ndi wophunzira munjira yomwe ingathandize kuti amasuke). Ndifuna ndikuuze za ine, [muuzeni nambala ya ana anu, zaka zawo ndi zina zomwe mumachita ndi zimene mulinazo]

1. Tsopano ndikufuna iweyo undifotokozere za iwe ndi banja lakwanu. [Wait for response; if student is reluctant, ask question 2, but if they seem comfortable continue to verbal consent].
2. Kodi umakonda kuchita chiyani ukakhal kuti uli kunyumba?

Kupempha chilolezo

- Ndikuuze chifukwa chimene ndabwerera kuno. Ndine mphunzitsi ndipo ndikufuna kumvetsetsa mmene wophunzira mumaphunzirira kuwerenga mchichewa . Mwa mwayi iwe wasankhidwa kuti ndicheze nawe.
- Tipempha thandizo lako pa zimenezi koma ngati simukufuna kutenga nawo gawo m’masewerawa, simuli wokakamizidwa.
- Tichita sewero lowerenga. Ndikufunsa kuti unditchulire dzina ndi liwu la lembo, undiwerengere mawu ndi nkhani mokweza.
- Ndigwiritsa ntchito wotchi iyi kuti ndiwone nthawi yomwe utenge powerenga ndipo ndikufunsa mafunso.
- Awa simayeso, ndipo sizikhudzana ndi zotsatira za maphunziro ako a mkalasi.
- Ndikufunsanso mafunso ena okhudzana ndi banja la kwanu monga, makhalidwe akusukulu kuno, chilankhulo chomwe mumalankhula kunyumba kwanu ndi zinthu zina zomwe muli nazo kwanu.

- Zomwe tkambirane pano, sindikauza wina aliyense monga makolo ako, amphunzitsi, kapena wina aliyense. Zotsatira zomwe tikambirane pano, zikaphatikizidwa ndi zaophunzira once amene ticheze nawo ndipo maina anu sakaoneka pogawana ndi ena zotsatirazi.
- Tisanapitilire, ndibwerenzenso kuti iwe uli ndi ufulu woyankha mafunso kapena ayi. Ngakhale tili mkati mwa kucheza uli ndi ufulu kukana kuyankha mafunso.
- Ngati sukufuna kuti ndicheze nawe utha kubwerera m'kalasi.
- Uli ndi funso tisanayambe? Tikhoza kuyamba?

Chongani mukabokosika ngati ophunzira wavomereza kuyesedwa:

☐ INDE

(Ngati wophunzira sanavomereze kuyesedwa, muthokozeni ndi kuitana ophunzira wina pogwiritsa ntchito chipepala chomwechi.)

A. Tsiku la Mayeso	Tsiku : _____		I. Kalasi	2 = Sitandade 2 4 = Sitandade 4
	Mwezi : _____			
B. Dzina la Woyesa				
C. Dzina la Sukulu			J. Dzina la Mphunzitsi	
D. Dera			K. Sitilimu	

E. Boma			L. Dzina la ophunzira M. Nambala yachinsinsi ya ophunzira	
F.Chigawo			N. Zaka zakubadwa	
G. Location :	1 = Urban 2 = Rural		O. Mwamuna kapena Mkazi	1 = Mwamuna 2 = Mkazi
H. Mtundu wa Sukulu :	1 = Tsiku lonse 2 = M'mawa 3 = Masana		P. Nthawi Yoyambira	___ : ___

Gawo 1. Kumvetsa Nkhani (Listening Comprehension)

Ntchito iyi siyofunika kugwiritsa ntchito TSAMBA LA WOPHUNZIRA. (Werengani ndimeyi mokweza kawiri mopatsa chidwi.)

Tsopano ndikuwerengera nkhani yayifupi imene ili mchichewa kawiri, kenaka ndidzakufunsa mafunso angapo pa zomwe ndawerenga. Chonde umvetsere bwino pamene ndikuwerenga nkhanayi. Uyenera kuyankha mafunsowa m'mene ungathere mchichewa. Kodi ukudziwa chomwe ukuyenera kuchita? Kodi uli wokonzeka? Tiye tiyambe tsopano.

Tsiku lina ndimapita ku msika kukagula nyama. Mphepete mwamsewu ndinaona chikwama ndipo ndinachitola. Mkati mwa chikwamacho munali ndalama ndi makadi a ku banki. Nditawauza mayi anga iwo anandilangiza kukapereka chikwamacho kwa Mfumu. Tsiku lina mayi anga anayitanidwa kwa Mfumu. Kumeneku tinakumana ndi abambo ena omwe anali mwini chikwama chija. Bambowa anathokoza ndi ndalama zokwana K5000.00 ndi kulonjeza kupereka chithandizo pa maphunziro anga.

Tsopano ndikufunsa mafunso pankhani imene ndakuwerengera. Yesesa kuyankha mafunso mmene ungathere mchichewa.						
	wakhoza	Wakhoza m'chingerezi	koma	walakwa	sakudziwa	palibe yankho
Kodi nkhaniyi idachitikira kuti? [Inachitika kumudzi, mphepete mwa msewu, popita ku msika, kwa a mfumu]						
Kodi mkati mwa chikwama munali chiyani? [munali ndalama ndi makadi a ku banki]						
Chifukwa chiyani chikwama anakachipereka kwa Mfumu?						

[kuti chisungike chinthu a mfumu amayenera kudziwa, anamwuzamayi ake]					
Kodi kwa mfumu kunabwera ndani? [Kunabwera, mwini wa chikwama, amayi anu, inuyo]					
Ndi mphatso yanji yomwe mwini chikwama uja anapereka? [mphatso ya ndalama zokwana K5000.00 ndi chithandizo pa maphunziro, ndalama]					

Gawo 2. Kudziwa Dzina la Lembo - (Letter Name Knowledge)

Onetsani ophunzira pepala la malembo mu buku la ophunzira.Nenani:

Wachita bwino. Tsopano tiye tipite ku gawo lotsatira.

Ili ndi tsamba la malembo a mchichewa. Chonde tandiuze maina a malembo amene ungathe-osati maliwu a malembo koma maina a malembo. Sindikufuna kuti undiuze malembowo ali aakulu kapena aang’ono koma maina a malembo

Mwachitsanzo, dzina la lembo ili *[lozani lembo la ‘S’]* ndi ‘S’.

Tiye tiyesere: Ndiuze dzina la lembo ili *[lozani lembo la ‘U’]*

Ngati ophunzira ayankhe bwino nenani: **Wakhoza dzina la lembo ili ndi ‘U’:**

Ngati ophunzira alephere kuyankha molondola, nenani: **Dzina la lembo ili ndi ‘U’**

Tsopano yesera lembo lina: Ndiuze dzina la lembo ili *[lozani lembo la P]*:

Ngati mwana wayankha molondola, nenani: **Wakhoza, dzina la lembo ili ndi ‘P’**

Ngati mwana walephera kuyankha molondola, nenani: **dzina la lembo ili ndi ‘P’**

Kodi ukudziwa chomwe ukuyenera kuchita?

Ndikanena kuti “Yamba” Chonde tchula dzina la lembo lili lonse mofulumira ndi mosamala. Yamba pano ndipo ndi kupitiriza motere [*Lozani lembo loyamba mu mndandanda woyamba pamathero a chitsanzo ndipo lozetsani chala pa mzere woyamba*]. Ngati wafika pa lembo lomwe sukulidziwa, ndikuuza dzina lake kamodzi kokha basi. Ndikakuwuzwa udzipitiriza. Wakonzeka? Yamba tsopano.



Yambani kuwerengera nthawi pamene ophunzira wawerenga lembo loyamba. **Khalani Chete**. Yendetsani pensulo ndi kuchonga moyenera lembo lilironse lolakwa kapena lodumphidwa pogwiritsa ntchito pensulo polemba chizindikiro ichi (/). Werengerani lembo lomwe wazikonza yekha ngati lolondola. Ngati mwachonga kale lembo lodzikonza yekha kuti walakwa, zunguzani mzere pa lembolo ndi

kupitiriza. Ngati wophunzira wakupatsani liwu la lembo otsati dzina la lembo, nenani kuti: [“**Chonde undiwuze dzina la lembo**”] Mwana athandizidwe motero kamodzi kokha basi mu gawoli. Ngati mwana wadumphira lembo, chongani lembolo kuti walakwa koma musamuyimitse wophunzira. Ngati mwana adodoma kuyankha pa masekondi atatu, tchulani lembo kamodzi kokha basi ndipo lozani lembo lotsatira ndi kunena, **pitiriza**. Ngati mwana adodomanso kachikena, lodzani lembo lotsatira ndikunena kuti **pitiriza**. Chongani lembo lomwe mwapereka (kamodzi kokha basi) kapena ngati mwana wadumphira lembo chongani kuti walakwa.

PAKATHA MASEKONDI MAKUMI ASANU NDI LIMODZI (60) nenani “lekeza pomwepo.” Lozerani lembo lomalizira kuwerenga ndi chizindikiro ichi (I).

Lamulo loyamba: Ngati ophunzira alephere kupereka yankho lolondola limodzi mu mzere woyamba, nenani “Zikomo” siyilani pomwepo ntchitoyi ndipo chongani mu kabokosi komwe kali pamapeto ndi kupitiriza ndi ntchito ina.

Chitsanzo : S u P

1	2	3	4	5	6	7	8	9	10	
D	i	t	i	O	T	g	C	T	m	(10)
H	t	O	A	r	C	n	e	h	R	(20)
L	e	H	p	e	A	i	o	z	U	(30)
h	f	i	N	T	o	o	F	d	E	(40)
e	r	P	H	r	d	T	K	t	a	(50)
y	w	e	L	e	E	U	N	o	d	(60)
W	e	A	A	S	E	n	i	m	R	(70)
s	t	C	V	S	N	D	t	i	L	(80)
A	s	J	G	e	E	i	A	C	n	(90)
N	a	H	S	t	U	B	y	S	o	(100)

Lembani nthawi yomwe yatsala pa wotchi pamapeto (nambala ya masekandi) Lembani masekondi ngati mwana wamaliza mofulumira :

Chongani m'kabokosi ngati ntchitoyi sinapitirizidwe chifukwa ophunzira analibe mayankho olondola mu mzere oyamba.

Gawo 3. Kuwerenga Maphatikizo (Syllable Reading)

Onetsani wophunzira pepala la maphatikizo kuchokera m’buku la ophunzira. Nenani,

Awa ndi maphatikizo a malembo. Ndikufunsa kuti uwerenge maphatikizo ochuluka mmene ungathere.

Mwachitsanzo, phatikizo ili ndi: “jo”.

Tiye tiwerenge phatikizo ili: *[lozani phatikizo loti “bwe”]*:

[Ngati ophunzira ayankhe molondola, nenani]: **Wakhoza, phatikizo ili ndi “bwe”**

[Ngati

ophunzira alephere kuyankha molondola, nenani]: **phatikizo ili ndi “bwe”**

Yesa phatikizo lina: werenga phatikizo ili [*lozani phatikizo loti “nu”*]

[Ngati ophunzira ayankhe molondola, nenani]: **Wakhoza, phatikizo ili ndi “nu”**

[Ngati ophunzira alephere kuyankha molondola, nenani]: **phatikizo ili ndi “nu”**

Ndikanena kuti yamba, uwerenge maphatikizo mofulumira ndi mosamala momwe ungathere. Werenga maphatikizo ali pa mzere uli wonse kuyambira apa ndikupitiriza mundondomeko yotere. Ngati ufike pa phatikizo loti si ukulidziwa, ndikuwuzza phatikizoli kamodzi kokha basi. Ndikhala chete kukumvetsera. Kodi ukudziwa zomwe ukuyenera kuchita? Ngati wakonzeka tiye tiyambepo.



Yambani kuwerengera nthawi pamene ophunzira wawerenga phatikizo loyamba. **Khalani Chete.** Yendetsani pensulo ndi kuchonga moyenera yankho lilironse lolakwa kapena lodumphidwa pogwiritsa ntchito pensulo polemba chizindikiro ichi (/). Werengerani phatikizo lomwe wazikonza yekha ngati lolondola. Ngati mwachonga kale mayankho odzikonza yekha ngati olakwa, zunguzani mzere pa phatikizolo ndi kupitiriza. Ngati mwana adodoma kuyankha pa masekondi atatu, tchulani phatikizolo kamodzi kokha basi ndipo lozani phatikizo

lotsatira ndi kunena kuti, **pitiriza**. Ngati mwana adodomanso kachikena, lodzani phatikizo lotsatira ndikunena kuti **pitiriza**. Chongani phatikizo lomwe mwapereka (kamodzi kokha basi) kapena ngati mwana wadumphaphatikizo chongani kuti walakwa.

PAKATHA MASEKONDI MAKUMI ASANU NDI LIMODZI nenani “lekeza pomwepo.” Lozerani phatikizolomalizira kuwerenga ndi chizindikiro ichi.

Lamulo loyamba: Ngati ophunzira alephere kupereka yankho lolondola limodzi mu mzere woyamba, nenani “Zikomo” siyilani pomwepo ntchitoyi ndipo chongani mu kabokosi komwe kali pamapeto ndi kupitiriza ndi ntchito

Chitsanzo : jo bwe nu

1	2	3	4	5	6	7	8	9	10	
ka	mi	po	ra	bwa	Dza	mnya	na	da	li	(10)
nja	thu	da	ki	fu	Ng	ko	tsi	hi	mp	(20)

mfu	fa	fo	se	pi	Lu	mda	mse	dzi	tse	(30)
ma	ye	re	na	me	Pa	mkha	wo	si	ntha	(40)
dya	nyu	nu	wa	ri	Ka	mwa	ba	ku	go	(50)
de	le	tu	sa	nkho	Nga	fi	wi	la	nda	(60)
te	mba	ndi	ti	zi	Zo	va	ya	no	mu	(70)
phu	mbo	Be	cha	kwa	Mbi	tho	za	ne	chi	(80)
yo	yi	pe	ke	mle	Kwe	ndo	wu	nkha	ta	(90)
tso	ngo	ni	ja	kho	Bwi	lo	nzi	ndu	mo	(100)

Lembani nthawi yomwe yatsala pa wotchi pamapeto (nambala ya masekandi) Lembani masekondi ngati mwana wamaliza mofulumira:

Chongani m'kabokosi ngati ntchitoyi sinapitirizidwe chifukwa ophunzira analibe mayankho olondola mu mzere oyamba.

GAWO 4: KUWERENGA MAWU ODZIWIKA (Familiar Word Reading)

Onetsani ophunzira pepala la mawukuchokera m'buku la ophunzira. Nenani,

Awa ndi mawu a m'Chichewa. Ndipo ndikufuna iwe undiwerengere mawu ambiri omwe ungathe mchichewa. Mwachitsanzo, mawu awa: “khama”.

Tiye tiwerenge mawu awa: *[lozani mawu oti “ona.”]*:

[Ngati ophunzira ayankhe molondola, nenani]: **Wakhoza, mawu awa ndi “ona”**

[Ngati ophunzira

alephere kuyankha molondola, nenani]: **mawu awa ndi “ona”.**

Yesa mawu ena: werenga mawu awa *[lozani mawu oti “bakha”]*

[Ngati ophunzira ayankhe molondola, nenani]: **Wakhoza, mawu awa ndi “bakha”**

[Ngati ophunzira alephere kuyankha molondola, nenani]: **mawu awa ndi “bakha”**

Ndikanena kuti yamba, uwerenge mawu mofulumira ndi mosamala. Werenga mawuwo pa mzere uli wonse.

Ndikhala chete kukumvetsera pokhapokha ukafuna chithandizo. Kodi ukudziwa zomwe uchite? Ngati wakonzeka tiye tiyambepo.



Yambani kuwerengera nthawi pamene ophunzira wawerenga mawu onse. Yendetsani pensulo ndi kuchonga moyenera yankho lolakwika pogwiritsa ntchito pensulo polemba chizindikiro ichi (/). Werengerani mawu odzikonza yekha ngati olondola. Ngati mwachonga kale mayankho odzikonza yekha ngati olakwa, zunguzani mzere pa lembolo ndi kupitiriza. Khalani chete pokapokha akamapereka mayankho motere: ngati ophunzira adodoma kuyankha pa masekondi atatu, werengani mawuwo ndi kunena, pitiriza. Izi ziyenera kuchitika kamodzi kokha. Chongani mawu omwe mwapereka kwa mwana.

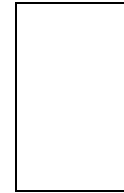
PAKATHA MASEKONDI MAKUMI ASANU NDI LIMODZI (60) nenani “lekeza pomwepo.” Lozerani mawu omalizira kuwerenga ndi chizindikiro ichi (I).

Lamulo loyamba: Ngati ophunzira alephere kuwerenga mawu amodzi mu mzere woyamba, nenani “Zikomo” siyilani pomwepo ntchitoyi ndipo chongani m’kabokosi komwe kali pamapeto ndi kupitiriza ndi ntchito ina.

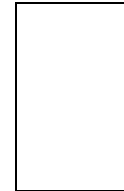
Chitsanzo : khama ona bakha

1	2	3	4	5	
Atate	chiwala	Amayi	zovala	chakudya	(5)
Zina	atate	nyumba	lata	ndili	(10)
Fisi	malangizo	Mutu	mbalame	mnyamata	(15)
Pamanda	agogo	Tsiku	chimanga	bwino	(20)
Monga	mbewu	Zinthu	anthu	mitengo	(25)
Kalulu	ambiri	kwambiri	ana	abambo	(30)
Mbozi	kwawa	zakudya	mphunzitsi	koma	(35)
Izi	kudziwa	Lina	mlonda	kusamala	(40)
Kuti	zipatso	nkhalango	iwo	zambiri	(45)
Mlendo	ena	mbatata	Iye	akulu	(50)

Lembani nthawi yomwe yatsala pa wotchi pamapeto (nambala ya masekandi: Lembani masekondi ngati mwana wamaliza mofulumira



Chongani m'kabokosi ngati ntchitoyi sinapitirizidwe chifukwa ophunzira analibe mayankho olondola mu mzere oyamba.



**Gawo 5. Kumvetsera nkhani (ORAL passage
READING)**

Onetsani ophunzira pepala la nkhani yaifupi kuchokera m'buku la ophunzira. Nenani:

Iyi ndi nkhani yayifupi. Ndifuna iwe undiwerenga mofulumira komanso mosamala. Ukatha kuwerenga mafunso pa zomwe wawerenga. Kodi wamvetsetsa chikutha kuchita? Ndikanenena kuti yamba, werenga mpaka pomwe mchichewa. Ine ndikhala chete ndikumvetsera, ndilankhala ukafuna thandizo. Wakonzeka? Yamba kuwerenga.

Gawo 6. Kuwerenga ndi kumvetsera nkhani (Reading Comprehension)

Pakatha masekandi 60 kapena wophunzira akatsiriza kuwerenga ndime m'masekandi osaposerera, 60 werengani funso loyamba. CHOTSANI

NDIMEYI PAMENE AKUYANKHA MAFUNSO

Mpatseni wophunzira masekandi 15 kuti ayankhe funsolo. Chongani yankho la wophunzira ndi kumuwerenga funso lotsatira.

Werengani mafunso a mzere uliwonse mpaka pamene ophunzira walekeza kuwerenga.



Yambani kuwerengera nthawi pamene wophunzira wawerenga mawu oyamba. Yendetsani pensulo ndi kuchonga moyenera yankho lolakwa pogwiritsa ntchito pensulo polemba chizindikiro ichi

(/). Werengerani ngati cholondola pamene wophunzira wadzikonza yekha. Ngati munachonga kale mawu wodzikonza yekha ngati olakwa, lembani mzere mozungulira mawuwa ndi kupitirira. Khalani chete wophunzira akamawerenga, ngati wophunzira wadodoma kuwerenga pa mphindi zitatu, muwerengereni mawuwo kenaka lozani mawu otsatira ndikumuuza kuti “pitiriza”.Izi ziyenera kuchitika kamodzi kokha Chongani mawu omwe mwapereka kwa wophunzira.

Wachita bwino. Tsopano tiye tipite ku gawo lotsatira.

PAKATHA MASEKONDI MAKUMI ASANU NDI
LIMODZI (60) NENANI “lekeza pomwepo.” Lozerani
mawu omalizirakuwerenga ndi chizindikiro ichi (I)

Lamulo loyamba: Ngati wophunzira walephera
kuwerenga mawu a mumzere woyamba, nenani “Zikomo”
siyira pomwepa kuwerenga. Ndipo chongani m’kabokosi
komwe kali pamapeto ndi kupitiriza ndi ntchito ina.

Tsopano ndikufunsa mafunso angapo okhudza nkhani yomwe wawerenga. Yesetsa kuyankha mafunsowa mmene ungathere..

			wakhoza koma m'chinge rezi	Walakwa	sakudziwa	Palibe yankho
Lachisanu m'mawa Mada anakonzekera kupita ku sukulu.	6	Kodi nkhaniyi inachitikira kuti? [Nkhaniyi imachitikira ku sukulu]				
Tsikuli lidali lotsekera sukulu. Mafumu ndi makolo anafika ku	22	Nanga chimachitika pa tsikuli ndi chiyani?				

sukulu ya Kaliza kuti adzawonerere luso lowerenga.		[Tsiku lotsekera school. Ophunzira a Sitandade 1 amawonetsa luso lowerenga.]					
Iyeyu adali ndi nkawa chifukwa adali mtsikana wamng'ono ndipo anali kuyamba kumene sitandade 1.	36	Kodi n'chifukwa chiyani Mada anali ndi nkawa? [Mada anali ndi nkawa chifukwa anali mtsikana wamng'ono. Kunali kuyamba kumene sitandade 1]					
	49						

Mada anawerenga mopatsa chidwi poyerekeza ndi msinkhu wake. Anthu adasangalala kwambiri ndipo anamusupa ndalama.		Tchulani chifukwa chimene mbiri ya Mada inapitira patali? [Mada anawerenga mopatsa chidwi poyerekeza ndi msinkhu wake.]					
Mbiri ya Mada idapitira patali.	54	Kodi anthu amamusupa chiyani Mada? [Anthu adamusupa Mada ndalama]					

Lembani nthawi yomwe yatsala pa wotchi pamapeto (nambala ya masekandi):



Chongani m'kabokosi ngati ntchitoyi sinachitike chifukwa wophunzira analibe mayankho
olondola mu mzere woyamba



Wachita bwino. Tsopano tiye tipite ku gawo lotsatira.

Gawo 7a. Kumvetsera nkhani (ORAL passage READING: 180 seconds / 3minutes)

Do not administer 7a and 7b for learners that scored zero on Sections 5 and 6 above. If it was not zero or a perfect score, show the child the story in the learner stimuli booklet again. Say,

Nayinso nkhani ija. Tsopano ukhala ndi mphindi zitatu kuti uwerenge nkhanayi momwe ukufunira, mokweza kaya cha mumtima, ukhozanso kuwerenga mobwereza kuposa kamodzi. Ukamaliza kuwerenga, ndikufunsa mafunso okhudzana ndi nkhani wawerenga. Kodi ukudziwa chomwe ukuyenera kuchita? Ndikanena kuti **“yamba”** uwerenge nkhanayi momwe ukufunira. Ine ndikhala chete ndikukumvetsera mpaka mphindi zitatu zitatha. Wakonzeka? Yambapo.

Gawo 7b. Kuwerenga ndi kumvetsera nkhani (extended Reading comprehension: 180 seconds / 3min)

Pakatha masekandi **180** kapena wophunzira akatsiriza kuwerenga ndime m'masekandi osaposerera **180**. werengani funso loyamba. Siyani ndimeyi yotsegula kuti ophunzira athe kuona pamene akuyankha mafunso.

Mpatseni wophunzira masekandi **30** kuti ayankhe funsolo. Chongani yankho la wophunzira ndi kumuwerengera funso lotsatira.

Werengani mafunso a mzere uliwonse mpaka pamene ophunzira walekeza kuwerenga.



Yambani kuwerenga nthawi ndipo mukhale chete. PAKATHA

MASEKONDI 180 NENANI “lekeza pomwepo.”

Lamulo ngati mwana wamaliza mwachangu kuwerenga: Ngati wophunzira

akuti wamaliza kuwerenga mphindi zitatu zisanathe, mutha kuyamba

kumufunsa mafunso.

Tsopano ndikufunsa mafunso okhuzana ndi nkhani imene wawerengayi. Yesetsa kuyankha bwinobwino mafunso onse.

			wakhoza	Wakhoza koma m’chingerezi	Walakwa	sakudziwa	Palibe yankho
Lachisanu m’mawa Mada anakonzeka kupita ku sukulu.	6	Kodi nkhanayi inachitikira kuti ?					

		[Nkhaniyi imachitikira ku sukulu. Tsiku lotsekera sukulu]					
Tsikuli lidali lotsekera sukulu. Mafumu ndi makolo anafika ku sukulu ya Kaliza kuti adzawonerere luso lowerenga.	22	Nanga chimachitika pa tsikuli ndi chiyani? [Ophunzira a Sitandade 1 amawonetsa luso lowerenga.]					
Iyeyu adali ndi nkhawa chifukwa adali mtsikana wamng'ono ndipo anali kuyamba kumene sitandade 1.	36	Kodi n'chifukwa chiyani Mada anali ndi nkhawa? [Mada anali ndi nkhawa chifukwa anali mtsikana wamng'ono. Kunali					

		kuyamba kumene sitandade 1]					
Mada anawerenga mopatsa chidwi poyerekeza ndi msinkhu wake. Anthu adasangalala kwambiri ndipo anamusupa ndalama.	49	Tchulani chifukwa chimene mbiri ya Mada inapitira patali? [Mada amawerenga mopatsa chidwi poyerekeza ndi msinkhu wake.]					
Mbiri ya Mada idapitira patali.	54	Kodi anthu amamusupa chiyani Mada ? [Anthu adamusupa Mada ndalama]					

Lembani nthawi yomwe yatsala pa wotchi pamapeto (nambala ya masekandi):

Chongani m'kabokosi ngati ntchitoyi sinachitike chifukwa wophunzira analibe mayankho olondola mu gawo 5 ndi 6

Nthawi yomaliza kuyesa ophunzira:

____ : ____ (maola 24)

Appendix 2: Pupil questionnaire

IMPACT OF EARLY NUTRITION SUPPLEMENTATION AND CONTEXTUAL FACTORS ON STUDENTS' ABILITY TO ACQUIRE READING SKILLS IN LUNGWENA, MANGOCHI DISTRICT, MALAWI.

Draft Questionnaire for collecting data on pupil household school practices on learning reading.

UNIVERSITY OF MALAWI

February, 2019

Pupil ID Number: _____

Instructions:

- Administer this questionnaire immediately after completing the reading test with each student
- Ensure that the pupil ID on the reading test is indicated on the top right corner of this questionnaire.

Question	Response Code	Response code translation	Tick Box
	0	Once a day	
	1	Twice a day	
	2	Three times a day	

Question	Response Code	Response code translation	Tick Box
1. How many times in a day do you take a meal?	3	More than three times a day	
	4	No response	
2. What language do you use at home?	0	Chichewa	
	1	Chiyao	
	2	No response	
3. How many days were you absent from school?	0	None	
	1	Once	
	2	Twice	
	3	Thrice	
	4	More than four days or four days	
	5	No response	
4. How many times are you read to at home?	0	Nobody reads to me at home	
	1	Once a day	
	2	Twice a day	
	3	Three times a day	
	4	More than three times a day	

Question	Response Code	Response code translation	Tick Box
5. Who reads to you at home?	0	Nobody	
	1	My mother	
	2	My father	
	3	My siblings (brother, sister, cousin)	
	4	My peers (friends)	
	5	Part time teacher (reading clubs)	
6. How many books other than school textbooks do you have at home?	0	None	
	1	One book	
	2	Two books	
	3	More than two books	
7. Where else do you get books to read?	0	No where	
	1	School library	
	2	Class teacher	
	3	Friends (classmates)	
8. Apart from school where	0	Nowhere	
	1	Church	

Question	Response Code	Response code translation	Tick Box
else do you to read?	2	Madrasa	
9. Are you given reading homework by your teacher?	0	No	
	1	Yeas	
10. Do you practice reading homework?	0	No	
	1	Yes	

Many thanks for your time. Here is a pencil to help you practice writing.

End of questionnaire

Appendix 3: School resources checklist

IMPACT OF EARLY NUTRITION SUPPLEMENTATION AND CONTEXTUAL FACTORS ON STUDENTS' ABILITY TO ACQUIRE READING SKILLS IN LUNGWENA, MANGOCHI DISTRICT, MALAWI.

Draft checklist for collecting data on school resources that affect pupil ability to learn reading.

UNIVERSITY OF MALAWI

February, 2019

Instructions:

- Observe around the school and fill in a response to each question below.
- Circle 0 for agreeing and 1 for disagreeing with what you observe for each question. Do not tick any box.
- Do not write down the name of the school. Get the school registered number from the Head teacher's record. Ensure that this is the number allocated to the school from the Education Management Information Systems questionnaire return available at each primary school
- Note that some of the questions require conducting and filling in after observing classrooms. Therefore ensure that this is the first questionnaire you fill in before conducting the reading tests with sampled pupils.
- Take a geographical coordinates for each school visited.

School Number:		
Enumerator ID:		
Geo-Coordinates		
Classrooms have space for the teacher and pupils to move around	Agree	Disagree
	0	1
Class schedule for entire school is available in HT's office or Teachers Room	Agree	Disagree
	0	1
A teachers' lounge/room is available	Agree	Disagree
	0	1
Teachers' lounge/room is in good condition	Agree	Disagree
	0	1
Classrooms have sufficient ventilation	Agree	Disagree
	0	1
Classrooms have sufficient light	Agree	Disagree
	0	1
Classrooms have electricity	Agree	Disagree
	0	1
The school has clean water available for pupils to drink/wash their hands	Agree	Disagree
	0	1
	Agree	Disagree

Classrooms appear to have a range of learning materials available – not simply years-old posters or paintings on the wall	0	1
The school has library books (even if there is no library)	Agree	Disagree
	0	1
There is a school (not classroom) library	Agree	Disagree
	0	1
The library appears to be well stocked	Agree	Disagree
	0	1
The library appears to be actively used by pupils and teachers	Agree	Disagree
	0	1
The books in the library are in good condition	Agree	Disagree
	0	1
Most textbooks appear to have been distributed to pupils	Agree	Disagree
	0	1
The resources in this school are adequate for teaching the material	Agree	Disagree
	0	1
Teachers/head teachers appear very engaged and interested in the development of pupils	Agree	Disagree
	0	1
Teachers/head teachers do not seem hostile or angry	Agree	Disagree
	0	1

No signs of physical punishment of pupils	Agree	Disagree
	0	1
School staff speak to pupils in a friendly, supportive way	Agree	Disagree
	0	1
No pupil fighting/bullying observed	Agree	Disagree
	0	1
No teasing among pupils observed	Agree	Disagree
	0	1

School resources checklist

End of checklist

Appendix 4: Informed consent for pupil interviews

Informed consent for participation in an interview

I volunteer to participate in a research project conducted by Chikondi Maleta from University of Malawi, P.O. Box 280, Zomba. I understand that the project is designed to gather information about academic work on conditions that:

- 1) My participation in this project is voluntary. I understand that I will not be paid for my participation.
- 2) I may withdraw and discontinue participation at any time without penalty. If I decline to participate or withdraw from the study, no one will be told.
- 3) I understand that most interviewees in will find the discussion interesting and thought-provoking. If, however, I feel uncomfortable in any way during the interview session, I have the right to decline to answer any question or to end the interview.
- 4) Participation involves being interviewed by researchers. The interview will last approximately 10 minutes. Responses will be recorded on the interview questionnaire sheet. If I do not want my responses to be recorded, I will not be able to participate in the study.
- 5) I understand that the researcher will not identify me by name in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.
- 6) I have understood the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.
- 7) I have been given a copy of this consent form.

My Signature

Date

My Printed Name

Signature of the Investigator

For further information, please contact:

Chikondi Maleta on +265994962567

Appendix 5: Consent from the Ministry of Education to conduct the study

University of Malawi
Faculty of Education
Zomba
+2651524222
P.O. Box 280
03/07/2019

Secretary for Education, Science and Technology,
P/B 238, Lilongwe 3.

Dear Sir,

Request for permission to conduct a PhD Research in Schools under Mangochi District Council

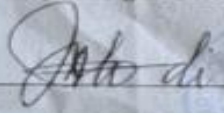
Sir, Chikondi Maleta is a PhD Candidate in Education with University of Malawi. His area of research interest is on predictors of acquisition of reading skills in primary education, targeting standards 1-4.

As part of the research, he will be looking at education and home contextual factors that affect acquisition of reading skills besides programming interventions that the education sector funds. He will be researching on the effect of nutrition on acquisition of reading skills for students in standards 1-4. To do this, He will adapt the Ministry of Education, Science and Technology Early Grade Reading Assessment protocol and collect data on students who were part of a nutrition supplementation programme implemented by the College of Medicine tracing their cognitive abilities after the intervention. The study will involve pupils in standards 2-5. The study will also collect a checklist of resources available in schools and pupil's household characteristics to enable test of association of these factors to pupils' cognitive abilities.

Results from the study will inform theory on reading and nutrition, practice on development of National Programmes at the Ministry central level and enhance dialogue on how complimentary household factors associate with better learning outcomes – A key focus area in the National Education Sector Plan (NESP)

Sir, should you allow for this study to proceed in the schools in the area, the research agents will proceed with data collection the week of 8 July 2019 to allow time for the schools' administration of the third term examinations. The data collection exercise will reduce pupil and teacher time out of classrooms to ensure that teaching and learning is not disturbed.

Sir, would you please indicate your decision allowing/ disallowing the conduct of the study in primary schools in the Lungwena area in Mangochi District as described above.

Approved:  Date: 3/07/2019

Disapproved: _____ Date: _____



Appendix 6: Researcher's resume

Name: Chikondi Maleta

Nationality: Malawian

Date of Birth: 4th June 1979

Education:

- i) Master's in Education (Policy Planning and Leadership), 2009. University of Malawi, Chancellor College. (Area of study: Financing education and internal efficiency).
- ii) Bachelor of Social Science, Economics, 2003. Chancellor College. The University of Malawi. Area of study: Exploring variability of the monetary exchange rate in fixed and floating exchange rate regimes.

Other Training:

- i) Postgraduate Certificate on Engendering development policy, organizations and projects; 2007, University of Antwerp, Belgium, Institute of Development Policy (IOB)
- ii) Postgraduate certificate in education financing and international policy analysis, University of Massachusetts, Amherst, USA. Paper: Contextual issues in the financing of the University of Malawi strategic plan. 2004,
- iii) Postgraduate certificate on Education Sector Diagnostics, 2007, Institute for International Education Planning, Paris, France
- iv) Postgraduate certificate on Investment Analysis, 2007, East and Southern Africa Management Institute, Lusaka, Zambia

Countries of experience:

Malawi, Zambia (Desk work, based in Malawi), Syria (Desk work, based in Malawi), and SADC (Desk Work).

Professional affiliation

- i) Member, Economics Association of Malawi (ECAMA)

Board/ Director Membership

- i) Malawi Education Development Partners Group (2009-2019)
- ii) Press Agriculture Limited (2021 – Current)

Selected Works

Research/ Evaluation Works

- i) (2021) End of project review for Education Governance Scope of Work in the USAID and FCDO funded Local Governance and Accountability Project (LGAP)
- ii) (2020) Validation of Disbursement Linked Indicators (DLI) under the Global Partnership for Education (GPE) Programme, with oversight from the World Bank
- iii) (2020) Development of alignment tool for the Regional and National Planning, Monitoring and Evaluation, and quality control on the SADC annual operational plans 2020-2021

- iv) (2019) End of project review for the Zambia Education Budget Support Programme see http://iati.dfid.gov.uk/iati_documents/4006819.odt
- v) (2018) Annual review of the Keeping Girls in School Programme see http://iati.dfid.gov.uk/iati_documents/28384078.odt
- vi) (2019) End of programme review for the Keeping Girls in School Programme (2012 – 2018). See http://iati.dfid.gov.uk/iati_documents/44122320.odt
- vii) (2018) Project completion quality assurance on the Jordan Compact Education Programme (JCEP). See <https://devtracker.dfid.gov.uk/projects/GB-1-205200>

(2013-2017) Programme quality assurance on the following studies:

- i) Study on student repetition and attrition in Primary education in Malawi. Report available at https://pdf.usaid.gov/pdf_docs/PA00K473.pdf
- ii) Final evaluation of the Malawi Teacher Professional Development Support. Report available at https://pdf.usaid.gov/pdf_docs/PDACX458.pdf
- iii) Performance evaluation of the USAID sponsored \$21 million Early Grade Reading Activity. Report available at https://pdf.usaid.gov/pdf_docs/PA00KBNS.pdf
- iv) Impact evaluation of the \$18 million Early Grade Reading Programme. Results of which triggered my lead in design, mobilisation and start-up of the National Reading Programme. Sample reports are available at <https://shared.rti.org/content/malawi-reading-intervention-egra-impact-evaluation-report>

(2003-2009) Economic modelling:

- i) Development of the Education Sector Implementation Plan (ESIP I). A positive appraisal of the plans and models was made by the Malawi Local Education Group. The appraisal is available at http://www.globalpartnership.org/sites/default/files/2015_02_-_malawi_-_appraisal_.pdf
- ii) Strategic Planning. Co-lead the development of the Education Sector Plan (2009 – 2018) – see http://www.ilo.org/dyn/youthpol/fr/equest.fileutils.docHandle?uploaded_file_id=164 and its Education Sector Implementation Plan I.
- iii) IHIV and AIDS programming in the education sector. Co-led the development of Education Sector HIV/AIDS strategic plan and implementation guidelines (2009 – 2013). See https://pdf.usaid.gov/pdf_docs/PNADC463.pdf
- iv) Nutrition and School Health in primary education. Facilitated the development of the School Health and Nutrition Guidelines (see <http://www.300in6.org/wp-content/uploads/2014/07/13.-School-Health-and-Nutrition-Guidelines-by-GoM-20091.pdf>)
- v) Education systems analysis (Writing of a book chapter on the ‘The Education System in Malawi’. See <http://books.google.com/books?id=lkMiVKSIGsgC&printsec=frontcover&dq=The+education+system+in+malawi&source=bl&ots=jF0I6KUEuV&sig=uEX398L8a0UMz2f0aJasU54xFng&hl=en&sa=X&ei=Y6kHUPPsCOi36QGgloTdba&ved=0CDMQ6AEwAA#v=onepage&q=The%20education%20system%20in%20malawi&f=false>
- vi) (2002) High-level situation analysis of Shire Bus Lines – scope available at <https://www.nathaninc.com/malawi-shire-bus-lines-limited-high-level-situation-analysis/> , and
- vii) (2000) Tracer Study on Privatisation Retrenchees in Malawi

Work Experience:

Firm: Press Trust

Position: Head of Operations

Period: October 2020- Current

Firm: DAI/ Local Government Performance and Accountability project

Position: Technical Director – Education Governance

Period: September 2019 – September 2020

Firm: Department for International Development (DFID)

Position: Education Advisor

Period: February 2017 – September 2019

Firm: United States Agency for International Development (USAID)

Position: Programme Management Specialist

Period: September 2009 – February 2017

Firm: Malawi Government – Ministry of Economic Planning and Development

Position: Principal Economist

Period: September 2003 – September 2009

Firm: O&M Development Consulting

Position: Adjunct Researcher

Period: February 2000 – July 2003

Firm: Farmers World Limited

Position: Assistant Branch Manager

Period: February 1998 – January 1999

1. Certification

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Chikondi Maleta

Signature/initial

Date: February 2023