



Teacher Attributes of Turnover on Learning Achievement in Biology in Public Secondary Schools in Garissa County, Kenya

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Abstract: *The performance and survival of schools is largely dependent on teachers. The inadequacy of staffing schools with qualified and experienced teachers is however a major cause for lack of sufficient learning achievement in some schools today. The staffing problem is majorly attributed to teacher shortages occasioned by high teacher turnover. Conducted in Garissa County, this study sought to investigate the teacher turnover factors on learning achievement in Biology. The study was guided by Becker's Human Capital Theory of Occupational Choice and Gagné's Theory of Five Conditions of Learning. The study's philosophical paradigm was borrowed from the Pragmatic Worldview and embraced a convergent mixed-methods design. The target population was 2691 form three students and 95 teachers of Biology from 40 public secondary schools in Garissa County. Stratified random sampling was used in selecting 27 schools from which a sample of 387 respondents comprising 336 students and 51 teachers of Biology was selected. The samples were obtained using simple random and purposive sampling for students and teachers respectively. The research instruments used for data collection were teacher questionnaire and document analysis guide whose analysis was performed using both descriptive and inferential statistics for quantitative data and thematic analysis for qualitative data. The paper established that teacher attributes of turnover had p-value less than the level of significance indicating positive significant correlation with the learning achievement in Biology. Qualitative data findings further revealed that teacher attributes of turnover influenced chronic absenteeism, massive transfer requests and duty desertions. The study concluded that teachers' attributes influenced low learning achievement in Biology in public secondary schools in study area. The study recommended the Teachers' Service Commission to come up with robust mentorship programs for the newly employed teachers, provision of attractive remuneration and manage teacher transfer crises*

Keywords: Influence, Turnover factors, Teacher attributes, Teacher turnover, Learning achievement in Biology

How to cite this work (APA):

Makokha, T. D, (2026). Teacher Attributes of Turnover on Learning Achievement in Biology in Public Secondary Schools in Garissa County, Kenya. *Journal of Research Innovation and Implications in Education*, 10(3), 543 – 558.
<https://doi.org/10.59765/npf64>

1. Introduction

Education remains the most outstanding development prioritized area in the world today. It is widely regarded as a basic human right, a key to enlightenment, and a source of wealth and power (Mugenda & Mugenda, 2019). It is

critical to industrial and technological development with the history of developed nations bearing records of this, while developing nations aspiring to realize the same status have to put a premium. To acquire knowledge, one must learn, which according to Kiunga (2016), is the assistance provided by educators to a process of knowledge

acquisition, mastery of skills as well as the formation of attitudes and beliefs among students. Learning achievement encompasses the acquisition of knowledge in various subject disciplines including sciences which comprises the basic disciplines such as Biology, Physics, Chemistry and Mathematics. The Kenya Literature Bureau defines Biology as the natural science that studies life and living organisms, including their physical structure, chemical processes, molecular interactions, physiological mechanisms, development and evolution (KLB, 2018).

Studying Biology gives a learner an in-depth understanding of the natural world which helps one learn to conduct research, solve problems, be organized and think critically. Besides graduating with Biology degree opens the door to many exciting job opportunities (KLB, 2018). However, in spite of these vital facts, the learners' achievement in this significant subject in recent years has been low forcing many students to leave it and opt for Chemistry or Physics subjects which are comparatively performed better in national exams. For effective learning to occur in Biology, the subject ought to be taught properly by qualified, committed, competent, knowledgeable and experienced teachers using suitable methodologies as intended by education planners and curriculum developers (KICD, 2021).

According to UNESCO (2014), teachers are the categories of human capital based in schools that play an important role in enabling third world countries' dream of achieving the objective of Education for All by 2030 become a reality. Tipton (2013) observes that educational prosperity of our children largely depends on teachers and neither human nor technology can effectively replace them in terms of the influence they have on children. Nevertheless, research has shown that teachers represent a category of workers that is globally experiencing shortage issues (Ingersoll, 2013; Hanushek & Rivkin, 2005; Boe et al., 2017). A study by Imran (2017) established that teachers' shortage issues are mostly caused by high levels of turnover, which Ingersoll (2013) defined as "the departure of teachers from their teaching jobs".

According to Smylie and Miretzky (2014), teacher turnover negatively affects the students' learning achievement in schools. According to Galgóczi and Glassner (2018), numerous European countries have been experiencing a shortage in the teaching profession with the situation in Sweden particularly alarming. A study by Brandman University (2020) showed that as opposed to typical beliefs, the staffing challenges experienced by schools in United States of America were not primarily due to teacher short falls occasioned by retirements and increased students' enrolment. The study rather established that large numbers of teachers were leaving the teaching profession in pursuit of better careers.

Michelle (2015) highlights individual teacher attributes (age, gender and marital status) among the major determinants influencing their turnover. The study expounds further that high rate of teacher turnover is disruptive as it changes the composition in teacher quality in schools which impacts negatively on the students' learning achievement.

A recent study by IOL News Agency (2019) puts South Africa as the country in Africa with the highest rate of teacher turnover. The report further puts individual teacher attributes and low salaries among the highly learned as the strongest motives pushing teachers to seek alternative employment opportunities. Mampane (2015) posits that the attrition of these skilled personnel from the learning institutions has led to adverse effect on the capacity of the South African state to realize its millennium development goals. According to Smylie and Miretzky (2014), teacher turnover has led to deterioration of the standards of education in Africa. In Kenya, the enrolment of students in secondary school has increased tremendously in the last two decades owing to free primary education and subsidized secondary education. This however has not been matched with commensurate recruitment of teachers. The problem has further been compounded by massive teacher turnover for greener pastures. Onwonga (2018) established that approximately six thousand teachers leave the teaching profession annually. Similarly, according to the statistics from Teachers Service Commission, about 44 teachers retire, desert or resign teaching daily putting a strain on the sector that is already facing a shortage of about 100,000 tutors.

1.1 Statement of the Problem

The teaching profession remains the most outstanding career opportunity attracting thousands of applicants in Kenya today (Onwonga, 2018). As a noble career, teaching is supposed to enchant and maintain highly qualified and passionate professionals to instill knowledge and add value to the lives of millions of learners worldwide. Effective classroom instruction requires the expertise of qualified, experienced and contented teachers with excellent skills in class management and instructional strategies, ideal for enhanced student learning achievement (OECD, 2012).

However, in spite of several applicants showing high rate of interest in teaching job, a few years into employment, there are increased reported cases of teacher absenteeism, low morale and highly expressed desire by many educators to shift schools or exit the profession as a result of individual teacher demographics, job dissatisfaction and unsupportive school work environment (Onwonga, 2018). According to Abdiaziz (2019), the current high rate of teacher turnover in Kenyan public schools in Garissa

County is a major contributor to low learning achievement among students. Saeed et al., (2014), supposes that the intent to quit a job is a predictor of voluntary turnover and it is a major concern today worldwide for teacher employers in securing and maintaining highly qualified workforce in learning institutions.

Studies; Isaac et al. (2015), IOL News (2017) and Demis and Debitu (2020) established a positive correlation between teacher turnover and low learning achievement among students. According to Saeed et al., (2014), teacher turnover intention leads to the actual turnover and it initially reflects low-level job satisfaction which affects teacher's performance, effectiveness and productivity. Accordingly, Helman (2017) opined that high rate of turnover among highly-productive teachers is costly to affected schools as it hinders the implementation of planned curriculum and results to inadequacy of teaching staff which consequently affects the effective delivery of subject content to learners leading to dismal performance.

According to Onwonga (2018), understanding and addressing the aspects that cause teacher turnover is a major breakthrough for educational prosperity of any nation, particularly Kenya. The article endeavors to explore how student learning achievement in Biology is influenced in the intricate dynamics of teacher turnover in public secondary schools in Garissa County. This was done with a view of establishing the possible measures that should be considered in mitigating the gap that exists between teacher turnover factors and learning achievement in Biology.

1.2 Research Objective

The study sought to examine the attributes of teachers' turnover on learning achievement in Biology in public secondary schools.

2. Literature Review

2.1 Influence of Teachers' Turnover on Students' Learning Achievement

Teacher turnover leads to loss of institutional memory besides huge resources being spent on hiring and induction process; Ingersoll, (2013); Kiunga, (2016); Kini & Podolsky (2016) and John (2017). However, up to date, little empirical evidence exists relating influence of teachers' turnover on student learning achievement (Guin, 2014).

Scanty literature on turnover indicates that teachers who produce higher student learning achievement are less likely to stay in their current schools or in teaching profession

compared to their less effective peers (Hanushek & Rivkin, 2010). For instance, study by Boyd et al. (2011), uncovered the category of teachers that were more likely to transfer from New York City Schools were those who produced higher student learning achievement and had a longer teaching experience. Similarly, IOL News (2019) established that in South Africa, teachers who left a given school as a result of professional attrition tended to be more effective than those who stayed. However, neither Boyd et al. (2011) nor Hanushek and Rivkin (2010) established whether the teachers who transferred from various schools were more effective than those who replaced them, making it difficult to candidly conclude about the overall effect of teacher turnover on student learning achievement in affected schools.

In Kenya, teacher turnover has continued to rob the teacher employers a significant percentage of new educators who leave the profession before the elapse of five years (Ingersoll & Merrill, 2017). Ingersoll and Merrill (2017) further revealed that the rate of teacher turnover is over fifty percent higher in high-poverty and marginalized schools. The study further elaborated that teacher turnover also tended to be higher in low-performing schools in urban slums. According to Teacher Service Commission report (2020), teachers left the counties of Garissa, Wajir and Mandera public schools in droves due to teacher attributes, poor working conditions and insecurity. Ingersoll and Merrill (2017) further reveal that individual teacher attributes and unpleasant working conditions can be a very strong incentive to seek transfer or alternative employment opportunities. The attrition of these skilled personnel from the learning institutions, has led to adverse effect on the capacity of the former North Eastern Province to realize its academic excellence.

Numerous early studies attributed a substantial part of student learning achievement to teacher effectiveness and learner attitudes (Darling-Hammond, 2009). Factors such as the learner characteristics (age, gender, entry behavior and learning behavior) as core determinants of learning achievement have frequently been studied and debated upon (Wayne & Youngs, 2019). Although a substantial part of student learning achievement is attributable to teacher efficiency, to our knowledge, little is known about how teachers' attributes influence student learning achievement, making the current publication a venture in virgin land.

2.2 Influence of Teachers' Attributes of Turnover on Learning Achievement in Biology

Studies; Abrami et al, (2014), Arbuckle and Williams (2013) and Omolara (2010) have demonstrated that turnover among teachers is associated with their individual

attributes such as age, marital status and religious affiliation, The current paper further critically evaluates the influence of Biology teachers' attribute variables of turnover (gender, age, marital status, academic qualification, experience and designation) on student learning achievement in Biology in sampled public secondary schools in Garissa County.

2.2.1 Teacher's Gender of Turnover on Learning Achievement in Biology

Literature on gender as a teacher's attribute influencing turnover is conflicting. Some researchers have noted no significant differences between male and female teachers' intent to leave work (Nelson, 2015) while others have reported that female teachers' intent to leave more frequently than male (Tsui et al., 1992; Lachman & Diamant, 2017). According to Crossman and Harris (2006), male teachers are slightly more satisfied in teaching profession than female teachers hence likely to stay. Foley et al. (2015) Lilly et al. (2016) and Tipton, (2013) on the other hand find that male teachers intend to leave more than female teachers. This view is in congruence with research done by Cushman (2015) on societal norms for perceptions of gender roles which is more pronounced in the teaching profession. According to this study, many female teachers choose teaching profession primarily because of its working conditions such as suitable working hours and holidays that match their children's schedules (Cushman, 2015). In contrast, most male teachers choose the career as a means of social mobility (Ladebo, 2012) thus increasing their intent to quit.

Scholars have equally noted a significant connection between a teacher's gender and learners' academic performance. It has also been established that a teacher's gender does play a key role on job satisfaction, commitment and teacher's effectiveness in instructional process (Tipton, 2013). In accordance with Nelson (2015), female teachers tend to perform better in teaching than their male counterparts. This perception is also affirmed by Mwamwenda (2012), who suggested that learners taught by female teachers performed significantly better than those taught by male teachers in English language, Mathematics and Sciences in Botswana. In similar manner, Zuzovsky (2013) in her study in Israel also reported that learners taught by female teachers had on average higher academic achievement than those taught by male teachers. However, studies like Cushman (2010), Mills et al. (2011), and McGrath (2013) have demonstrated the positive impact male teachers can have on learners thus advocating for more males to pursue teaching profession because men were seen as positive role models to learners. According to Gibbs (2012) and Tucker (2015), many schools were calling for more male teachers in profession because "young children, particularly boys, need 'male role

models' in their lives"" The study of Arbuckle and Williams (2013) also established that, male teachers outperformed their female counterparts in areas of natural sciences, asserting authority, classroom management and using meaningful voice tones during instructional process. This finding conforms to that of Martin and Smith (2018) who opined that male teachers were rated higher as facilitators of academic performance than their female colleagues. Literature on the same study concluded that the exit of male teachers from the classrooms had more adverse effects on the academic outcome of learners (boys) as compared to that of female teachers. A gap that existed in reviewed literature was to relate the influence the teacher's gender had on the student learning achievement in Biology. This publication sought to unravel this.

2.2.2 Teacher's Age of Turnover on Learning Achievement in Biology

A few studies have related teachers' age to students' academic achievement with some having established a significant connection between the teachers' classroom effectiveness and their chronological age. According to the findings of the previous empirical study by Lopina et al. (2012), a teacher's age is a key factor of consideration for students' learning achievement, irrespective of school type. A further study by Lee (2013) regarding teachers' age carried out in Turkey grouped teachers into three categories as; young age, middle age and old age. The study showed that middle aged teachers were perceived by students to be more effective in classroom organization, management, motivation and communication competence. On contrary, the study of Cushman (2015) rated old teachers lower on teaching skills than young or middle-aged teachers. In Riley and Ryan (2009), younger teachers were rated highest in dedication and job commitment and thus not likely to leave. However, a study by Kong (2015) and Abrami and Apolloia (2014) found no significant difference between the ratings of young, mid-career and old teachers. This rating is also in line with Abrami and Apolloia (2014).

A study by Lee (2013) on association of teacher's age and learners' scores in sciences across public learning institutions in Asian countries discovered that learners taught by older teachers posed low scores than those taught by younger teachers. The study finding registered a huge setback to traditional perception that older teachers are better at instructional strategies and subject content mastery. However, Hayes (2015) asserted that the health problems associated with old age is a hindrance to teachers' instructional methodologies and vigor explaining the low learning achievement in students. The study concluded that as teachers' age increase their students' academic performance diminishes. In line with this thinking therefore, the study adds that young teachers are

not dedicated and lack job commitment hence their learners are likely to be affected less with their departure. However, the reviewed literature did not expound how teacher's age influenced the students' learning achievement in schools. Therefore, this article purported to find out.

2.2.3 Teacher's Marital Status of Turnover on Learning Achievement in Biology

Several studies (Fitzmaurice, 2012; Eyupoglu & Saner, 2013; Kibkebut, 2013; Olatunjis & Mokuolu, 2014) have been carried out on the relationship between marital status and teacher turnover. For instance, a study carried out in Britain by Gaziloglu and Tansel (2016) investigated individual teachers and job-related factors that had an impact on their turnover. The study revealed that married individuals had a lower turnover than the unmarried. Contrastingly, Olatunjis and Mokuolu (2014) examined marital status-turnover relationship in higher education in Turkey and showed that turnover of married teachers was much higher than that of unmarried.

Further, studies have showed contrasting findings based on teacher marital status against student learning achievement. According to Kong (2015) learners taught by single and married teachers had higher scores compared to those taught by separated and divorced teachers. Zhang and Fang's (2017) elaborated that psychological problems associated with separation and divorce affect teachers' dedication to duty, reducing their efficiency and productivity. Nevertheless, a study by Kong (2015) opined that unmarried teachers because of lacking any family issues are more dedicated and committed to their jobs hence their learners pose good academic results compared to their colleagues of other marital statuses. On the other hand, Ayeop (2013) affirmed that married teachers have higher job satisfaction compared to single, separated or divorced teachers hence teach best. In the same vein Eyupoglu and Saner (2013) examined teacher marital status against student academic performance relationship in higher education in Turkey. The results showed that scores of students taught by married teachers was much higher than those of learners taught by unmarried counterparts (single, separated and divorced teachers).

From the afore-reviewed studies, it is evident that the overall student academic achievement levels varied in relation to different teacher marital statuses. Whether married or single, teacher retention in schools is vital for effective learning achievement. The reviewed study was carried out in Turkey on teachers and learners from a particular race, culture and religion. Its findings cannot be generalized to a Kenyan context. For this reason, there is need for another study which evaluates the influence of teachers' marital status on varied students' learning achievement in Biology.

2.2.4 Teacher's Academic Qualification of Turnover on Learning Achievement in Biology

Challenges to retain highly educated staff have been reported in several studies. For instance, Rambur et al. (2013) found differences in turnover vary with education attainment and that highly educated staff display more turnover rate than their lower counterparts. In congruence, Sousa-Poza and Henneberger (2012) obtained significant positive correlation for the level of education and intention to leave, in that employee turnover increases with the level of education attainment. Benson (2015) and Butler (2016) posit that when employees attain higher qualifications, they tend to improve their chances of getting better jobs so this increases their levels of intention to leave. However, in contrast, a study conducted by Choong et al. (2013) suggests no significant difference from educational levels of teachers towards turnover.

Furthermore, empirical studies over the years have confirmed the existence of the relationship between teacher's qualifications and learners' academic achievement. For instance, Koedel (2017) established that variation in teacher quality to be a major contributor to student learning achievement. According to Unanma et al. (2013), a teacher who has high academic qualification has a high content in Biology than a less qualified teacher who is likely to produce students with low learning achievement in the subject. Butler (2016) further expounded that poorly qualified teachers have inadequate subject content and instructional methodologies essential in pedagogical requirement in sciences. According to Koedel (2017), a well-trained teacher is in command of subject matter and has ability to identify the learners' strengths and weaknesses thereby making teaching and learning process simpler and enjoyable. In addition, Islam et al. (2013) established that teacher turnover in schools was more likely observed in teachers with advanced levels of education. According to the study, learners would likely lose academic guidance when these highly-educated individuals transferred or sought employment opportunities elsewhere. However, it's worth noting that most of reviewed literature lacked the information correlating the influence of teacher's academic qualification on students' learning achievement in Biology, making the current article significant.

2.2.5 Teaching Experience of Teacher's Turnover on Learning Achievement in Biology

Maden (2014), Begüm et al. (2015) and Likoko et al. (2018) in their separate studies on teacher turnover established that educators who had stayed for a considerable length of time in a learning institution were usually reluctant to leave. This is so because the long period they stayed had enabled them to acquire institutional

investment in form of experience and skills acquired and relations developed over time. A study by Kamau et al. (2020), on relationship between experience and turnover found that teachers with less experience had a high turnover rate than those with high experience. In addition, a study by Maden (2014) revealed that highly experienced teachers exhibited higher levels of job satisfaction and professionalism and were thus associated with lower rate of turnover.

Regarding teacher's experience and student learning achievement, a few earlier studies have established a positive correlation between the two variables; Rice (2013) and Provasnik & Young (2013). In the same vein, Strauss and Vogt (2011) argued that teaching experience is a strong determinant of student academic achievement confirming the findings of Odumbe et al. (2015), who opined that teachers with long teaching experience enhance learners' academic performance because they are hands-on, hearts-on and keen on learner digression from performance. Further, Ongele (2017) posits that long teaching experience produces better learner results than short teaching experience. Ongele (2017) further illustrated that teaching experience gained over time has been known globally to improve knowledge, skills and productivity. It is traditionally held as a system influencer for efficient learner academic performance in learning institutions. According to Martin (2017), teachers' level of experience is considered as one of the fundamental aspects aimed at enhancing and improving learning achievement in schools. The study expounded that the longer the teachers stay in teaching the more they concentrate on classroom teaching which sharpens their preparedness skills. This often results in better classroom management and content delivery to learners thus enhancing students' learning achievement. A gap that existed in the existing literature was to correlate the influence teaching experience had on the students' learning achievement in Biology. This article aspired to find out.

2.2.6 Teacher's Designation of Turnover on Learning Achievement in Biology

A study by Irbil et al. (2011) linked work-position a teacher held and its direct or indirect influence on teacher turnover in learning institutions. The study established that teachers' turnover was determined by their designations at schools. Further, the study elaborated that assistant teachers and class teachers expressed higher turnover rate in comparison to heads of departments, deputy principals and principals. Similarly, MacIntosh (2013) supposes that teachers' job designations and privileges that come with those positions influence either intention to leave the job or stay.

As whether teacher designation influences student learning achievement, the study by Irbil et al. (2011) revealed that teachers with high job designations are highly committed

due to obvious restraints and pose good academic results as compared to those with low job designations. MacIntosh (2013) also affirmed that designation being expertise, qualification or teacher's rank at school usually determines job satisfaction. He argued that higher job contentment enhances a teacher's productivity, effectiveness, and performance resulting to improved learner academic outcome. It therefore means that student learning achievement is likely to drop if teachers of higher designations will continually transfer or exit the profession.

In the same vein, a study by Irbil et al. (2011) revealed that teachers with higher job designations are highly committed due to obvious restraints and pose good academic results in learners as compared to those with low job designations. MacIntosh (2013) also concurred with earlier scholars that designation being expertise, qualification or teacher's rank at school usually determines job satisfaction or dissatisfaction. However, Kimani et al (2013) argued that teacher's designation did not have any statistically significant correlation with students' learning outcome dismissing earlier held beliefs. The reviewed literature also did not have adequate information on the influence of teacher's designation on students' learning achievement in Biology making the current study significant. From the foregoing discussions, this paper is premised on the hypothesis that:

H₀₁: There is no statistically significant relationship between the teachers' attributes of turnover and learning achievement in Biology

3. Methodology

In order to address the research objective, this study adopted the methodology expounded in this section. The study embraced a Pragmatic Worldview whose philosophy arises out of actions, situations, and concerned with what works and solutions to problems (Patton, 2013). Pragmatism is applicable to this study because, it is a philosophical underpinning for mixed methods studies (Tashakkori & Teddlie, 2010). According to Saunders et al. (2012) and Wilson (2010) (as cited in Maswoswere, 2019), pragmatists argue that there are many different ways of learning and understanding because there are multiple realities. According to Rossman (2012), instead of focusing on single method, researchers should emphasize the research problem and use all possible approaches available to have in depth understanding of the problem. To this end, the study further employed a convergent mixed-methods design as illustrated below.

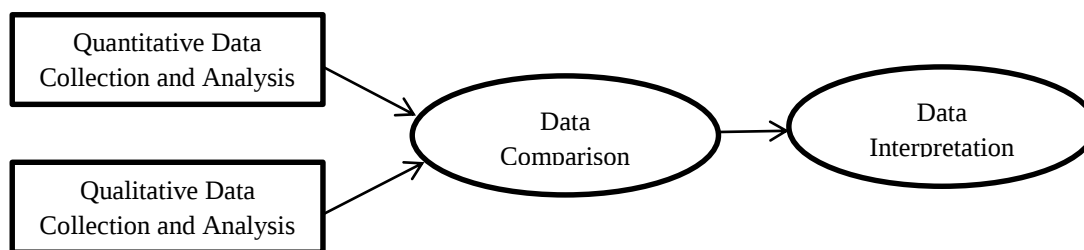


Figure 1: Convergent Research Design
Source: Creswell & Creswell, 2018

The design appropriately suited this study because it enabled the researcher to have across the board understanding of the study topic, had limited time, needed both quantitative and qualitative information to extensively understand the study topic and had adequate required skills to handle both quantitative and qualitative research methods (Creswell & Creswell 2023).

This study was conducted in Garissa County, located in what was formerly known as North Eastern Province. The Counties of Wajir, Tana River, Isiolo, Lamu and the Republic of Somalia border this County. This site was specifically selected because the students' learning achievement in Biology for a long period has been far much below the education stakeholders' expectations.

According to Abdiaziz (2019), the public secondary schools in Garissa County are characterized by young teachers, low teacher-students ration, inadequate physical facilities, poor roads, insecurity, and highest percentage of teacher turnover. The study expounded further that it is in this county where a student may be taught by more than ten different teachers between form one and form four due to problems associated with teacher retention.

According to the Ministry of Education data of 2023, Garissa County has 2691 form three students and 95 teachers of Biology drawn from 40 registered public secondary schools. The schools consist of two national, three extra-county and several county and sub county schools.

Table 1: Target Population

School Category	No per Category	No of Teachers
National	02	13
Extra County	03	11
County	08	20
Sub County	27	51
Total	40	95

According to Bryman and Bell (2014), the power of purposive sampling lies in selecting information rich cases for in-depth analysis related to the central issue being studied. In addition to teachers of Biology, form three students were considered in the study to ensure the participation of students who have been exposed to both Form One and Form Two Biology content, which is about 50% of the secondary school Biology curriculum. Most

importantly, form three Biology students were preferred because they had chosen to pursue Biology for their Kenya Certificate of Secondary Education (KCSE) level hence their attitudes towards the subject had stabilized and could be projected easily. Conclusively, teachers give a lot of attention to form four students at the expense of form three and the lower grades.

Table 2: Target Population and Sample Size

Respondents	Target Population	Sample	Percentage
Teachers of Biology	95	51	53.0%
Form Three Students	2691	336	12.5%
Total	2786	387	

Source: Field Data, 2023

The form three students' sample size estimation from the target population is in agreement with Krejcie and Morgan Formula of sample size determination as shown below;

$$n = \frac{X^2 * N * P * (1-P)}{(ME^2 * (N-1)) + (X^2 * P * (1-P))}$$

Where :

n = sample size

X^2 = Chi – square for the specified confidence

N = Population Size

P = population proportion (.50 in this table)

ME = desired Margin of Error (expressed as a

$$n = \frac{1.96^2 \times 2691 \times 0.5 \times 0.5}{0.05^2 \times 2690 + 1.96^2 \times 0.5 \times 0.5} = \frac{2584.4364}{6.728 + 0.9604} = \frac{2584.4364}{7.6884} = 336$$

Thus, a total sample of 387 participants was obtained for the study and comprised 51 teachers of Biology and 336 form three students. Both the teacher questionnaire and document analysis guide were used to generate detailed data relating to influence of teacher turnover factors on student learning achievement in Biology.

The collected data was accurately scored and systematically organized to facilitate data analysis (Gay et al., 2006). Data from the teacher questionnaire was analyzed and presented by descriptive and inferential statistics using Pearson Product Moment Correlation and Multiple Linear Regressions as depicted in the next section. According to Kumari and Yadav (2018) multiple linear regressions is a statistical method used to model the relationship between two or more predictor variables and a response variable.

Ethical Considerations

Ethics in research entails confidentiality, anonymity, volunteerism and appropriateness of researcher's behavior as relates to the rights of respondents (Orodho et al., 2016). In line with the current study, the researcher sought permission from the National Council of Science, Technology and Innovations (NACOSTI) to conduct research in the selected sample schools in Garissa County, a study site selected without the researcher's vested interest. According to the recommendations of Creswell and Creswell (2018), selection of study site with researcher's vested interest is a breach of research ethics.

During the research process, anonymity of study participants and confidentiality of the information obtained were given high priority. The questionnaires were designed such that the respondents did not have to indicate their names (Bryman 2004; Gay et al., 2006). Moreover, the schools from which the data were generated remain undisclosed and the collected data were used for academic purposes only.

Prior to data collection process, the participants were thoroughly informed about the study purpose before the research instruments were distributed for them to make informed consent (Creswell, 2014). This was done to refrain the researcher from pressurizing the participants thus ensuring that participation in the study was purely voluntary. The researcher purposely strove for honesty in all communications, avoided plagiarism and honestly collected data, analyzed it and reported the true data results and conclusions.

4. Results and Discussion

The paper sought to examine teacher turnover factors in form of teacher attributes of turnover and how the same influence learning achievement in Biology among secondary schools in Garissa County. Six items were scored on a five-point Likert scale of; Strongly Disagree=1, Disagree=2, Undecided=3, Agree=4 and Strongly Agree=5 to address this objective. The attributes included gender, age, marital status, level of education, teaching experience and job designation. The descriptive findings are as presented in Table 3.

Table 3: Teachers' Attributes of Turnover and Learning Achievement in Biology

Statements	SD (%)	D (%)	U (%)	A (%)	SA (%)	M	SD
1. My gender influences my instructional process in Biology class	6(12.2)	6(12.2)	10(20.2)	16(32.7)	11(22.4)	3.41	1.396
2. My age influences my instructional process in Biology class	5(10.2)	10(20.4)	8(16.3)	17(34.7)	9(18.4)	3.31	1.290
3. My marital status influences my instructional process in Biology class	7(14.3)	10(20.4)	12(24.5)	13(26.5)	7(14.3)	3.06	1.991
4. My academic qualification influences my instructional process in Biology class	5(10.2)	8(16.3)	8(16.3)	14(28.6)	14(28.6)	3.49	1.324
5. My teaching experience influences my instructional process in Biology class	6(12.4)	9(18.4)	4(8.2)	17(34.7)	13(26.5)	3.45	1.290
6. My current designation influences my instructional process in Biology class	13(26.5)	15(30.6)	12(24.5)	5(10.2)	4(8.2)	1.43	1.295
Average Mean and SD						3.01	1.292

Source: Source: Research Data, 2023

Legend: Strongly Disagree = SD, Disagree = D, Undecided = U, Agree = A, Strongly Agree = SA, Mean = M, Standard Deviation = SD.

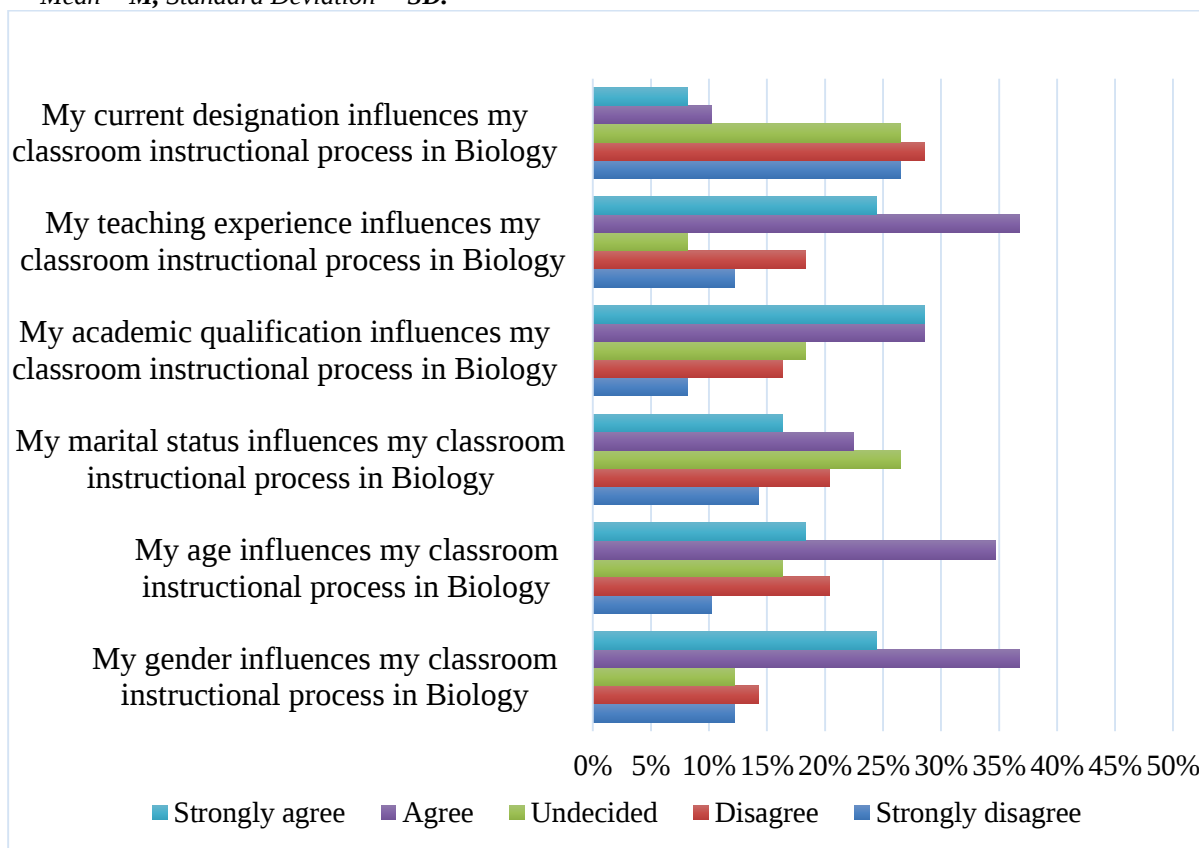


Figure 2: Influence of Teachers' Attributes of Turnover on Learning

Table 3 presents the study findings on how Biology teachers' attributes of turnover affect the learning achievement in the subject in public secondary schools in Garissa County. The findings indicate that majority of the teachers of Biology represented by 27(55.1 %) agreed that their gender did influence their instructional process in the Biology class. However, 12(24.4%) of teachers disagreed while 10(20.2%) were undecided. This item had a mean rating of 3.41 and a standard deviation of 1.396 implying that Biology teachers' gender highly influenced their effectiveness in the choice of teaching strategies, methodologies and content delivery in the subject hence affecting students' learning achievement. Knowledge on the influence of teachers' gender in teaching is vital as it assists education stakeholders to employ and deploy teachers in schools depending on learners' varied needs essential for enhanced learning achievement.

This finding is corroborated by the data collected using the Document Analysis Guide which revealed a significantly high rate of male teachers' absenteeism, missing of lessons, late duty reporting and early departure from schools as compared to their female counterparts. The records as well showed a sad trend of teachers (both male and female) being absent from the schools during both the initial and final weeks of the term. This implies that there was constant disruption of learning process in their schools at the beginning and also at the end of the terms.

The study findings are in perfect agreement with the reviewed literature on the extent the teachers' gender influenced the students' learning achievement. The results confirm the findings of several other scholars; Mwamwenda (2012), Zuzovsky (2013) and Martin and Smith (2018) who had earlier noted a significant connection between a teacher's gender and the learners' academic performance. For instance, Mwamwenda (2012) had suggested that learners taught by female teachers performed significantly better than those taught by male teachers in English language and Biology. The study argued that female teachers were clearly capable of completing the syllabus efficiently and within the allotted time than their male counterparts since the female gender has better self-discipline, is more focused and tends to have a lower turnover rate compared to male teachers.

The finding also agrees with the study by Tipton (2013), who noted that a teacher's gender do play a key role on job satisfaction, commitment and the teacher's effectiveness in instructional process thus influencing the learning achievement in the subject. The findings are also in line with those of Williams (2013) who established that male teachers outperformed their female counterparts in areas of mathematics, asserting authority, classroom management and using meaningful voice tones during instructional process. Similarly, the study finding conforms to that of

Martin and Smith (2018) who opined that male teachers were rated higher as facilitators of academic performance than their female colleagues. Therefore, based on the reviewed literature and the study finding, teacher turnover in schools involving both male and female teachers should be minimized as it negatively affects students learning achievement. The current study however, did not have adequate data to succinctly compare the learning achievement in Biology of students taught by male or female teachers in public secondary schools in Garissa County.

Secondly, when asked whether their age influenced their instructional process in Biology, majority of the teachers represented by 26(53.1%) affirmed that age indeed significantly influenced their instructional process in Biology. A significant 15(30.6%) of the teachers however disagreed with 8(16.3%) remaining undecided. The item had a mean rating of 3.31 and a standard deviation of 1.290. The study finding is authenticated by the qualitative data from staff management records. The records showed high rate of teacher transfer requests, resignations, duty desertions and interdiction. Data from the records also indicated that most of the transfer applicants were male teachers below the age of forty who stated various reasons of their intending to leave. Closer scrutiny of the records revealed a significant number of young male teachers (below 35 years) serving interdiction and duty desertion cases. This indicates that teacher's age is a factor of consideration affecting turnover in the study site which consequently affected the effectiveness in Biology classroom instruction.

The study findings are in congruence with the studies by Riley and Ryan (2009), Lopina et al. (2012), Lee (2013) and Cushman (2015), who had separately submitted that a teacher's age is a key factor of consideration for students' learning achievement in schools. Lee (2013) for instance had demonstrated that middle aged teachers were generally perceived by their students to be more effective in classroom organization, management and communication competence in comparison to young or middle-aged teachers. The results also share the same sentiments with Riley and Ryan (2009) who established that younger teachers were rated highest in dedication and job commitment. However, the study findings vary with the results of Kong (2015) and Abrami and Apolloia (2014) who found no significant difference between the ratings of young, mid-career and old teachers as concerns students' learning outcome.

The study further sought to find out whether teacher's marital status affected the students' learning achievement in Biology. The results from Table 3 above show that 20(40.8%) of teachers, representing the majority agreed that marital status influenced their instructional process in Biology. However, 17(34.7%) disagreed while 12(24.5%)

were undecided. The item had a mean rating of 3.06 and standard deviation of 1.991. This finding therefore, shows that majority of the teachers of Biology in secondary schools in Garissa County associated their effectiveness in teaching Biology as a factor which was moderately influenced by their marital status. A significantly large percentage of teachers; 12(24.5%) expressed indecision. Majority of members in this group probably consisted of separated / divorced teachers who did not want to commit their responses as a result of their current status. The finding of this item is further confirmed by the qualitative data from the schools' staff management records showing high rates of teacher transfer requests expressed by married teachers. The teachers intending to transfer cited reuniting with their families, taking care of ailing parents and reconciliation, for the cases of separated spouses.

The study findings augment those of Kong (2015), as reviewed in the literature which showed that teachers' marital statuses significantly affected their effectiveness in classroom instructional process. The findings are in consonance with Zhang and Fang (2017) who argued that learners taught by single and married teachers had higher scores compared to those taught by separated and divorced teachers. The findings also validate the study by Kong (2015) who expounded that unmarried teacher because of lacking family issues are more dedicated and committed to their jobs hence pose good academic results. The study results further agrees with the sentiments of Ayeop (2013) who affirmed that married teachers have higher job satisfaction hence teach best. According to Zhang and Fang (2017), the psychological problems associated with death of a spouse, separation and divorce affect teachers' motivation and dedication in instruction process leading to low learning achievement among students.

In the same vein, the researcher was interested in establishing whether Biology teachers' academic qualification affected their effectiveness in the teaching of the subject. The study established that 28(57.2%) of the teachers agreed while 13(26.6%) disagreed with 8(16.3%) remaining non-committal. This implies that (as also supported by mean of 3.49 and standard deviation of 1.324) Biology teachers' levels of education highly corresponded to their effectiveness in teaching the subject as well as developing intent to quit teaching. Based on this finding therefore, teachers of Biology with high academic qualifications such as Master's degree in education should pose better results in the subject compared to their colleagues with lower academic qualifications. Adeyemi (2010) opines that a better trained teacher produces higher academic performance than the untrained or less trained. This implies that the higher the qualification the teacher has, the better the academic achievement of learners.

This finding is supported by the data the researcher collected using the Document Analysis Guide from the

staff management records at the principals' offices in sampled schools. The records were blotted with information on issues of staff warnings, transfer requests, resignations, duty desertions and interdictions. The documents also revealed a shockingly large number of teachers had applied for transfers while a significant number were serving interdictions and duty desertion cases. The records showed that majority of the desertion cases had academic qualifications beyond first degree in education but were merely assistant or class teachers in schools they taught. Frustrations that accompany unrecognized higher academic credentials in individual teachers are bound to initiate turnover intentions. According to Benson (2015) and Butler (2016), when teachers attain higher qualifications, they tend to master content, sharpen their teaching strategies, improve their chances of getting better jobs and increase their levels of intention to leave.

The study results confirm, as seen in the literature review, an existence of the relationship between teacher's academic qualifications, enhanced learners' academic achievement and increased turnover. The results validate the findings of the studies by Unanma et al. (2013) and Koedel (2017) which established that variation in teacher's quality in relation to academic qualification is a major contributor to student learning achievement. The results also share same sentiments with Butler (2016) which demonstrated that poorly qualified teachers did not have subject content mastery and instructional methodologies essential in pedagogical requirement in Biology. Finally, the study finding is also in line with the recommendations of Islam et al. (2013) which stated that a well-trained teacher is in command of subject matter and has ability to identify the learners' strengths and weaknesses thereby making teaching and learning process simpler and enjoyable. This, according to the two studies transcends to enhanced student learning achievement. Additionally, the literature available indicates that learners lose academic guidance when highly-educated teachers transfer or seek employment opportunities elsewhere (Islam et al., 2013).

The teacher's experience in teaching is very significant for learning achievement in Biology. The current study findings further indicate that 30(61.1%) of the respondents agreed that teachers' effectiveness in Biology instructional process is highly influenced by their teaching experience, as also indicated by the item's mean of 3.45 and standard deviation of 1.290. The implication of this statement is that teachers who have been in the teaching career for a considerate length of time have better content mastery in the subject, are good at teaching methodologies and their learners pose higher scores in the subject compared to their newly employed colleagues. The study has shown that the longer the experience of teaching a particular subject, the better the academic achievement of learners taught by such a teacher.

This finding verifies those of numerous earlier studies (Maden, 2014; Begüm et al., 2015; and Likoko et al., 2018) that established positive correlations between the teacher's teaching experience and students' learning achievement. For instance, researchers like Rice (2013), Provasnik and Young (2013) and Goldhaber et al. (2019), found a significant relationship between teachers' experience and students' learning achievement. The study finding also supports that of Strauss and Vogt (2011) who argued that teaching experience is a strong determinant of students' academic achievement. Teaching experience gained over time, according to reviewed literature has been known globally to improve teacher's knowledge, skills and productivity, effective in learners' academic performance.

Similarly, the study finding is in line with Odumbe et al. (2015) who postulated that teachers with long teaching experience enhance learners' academic performance because they are hands-on, hearts-on and keen on learner digression from performance. Moreover, the findings also agree with a study by UNESCO (2017) who opined that the longer the teachers stay in teaching the more they concentrate on classroom instruction which sharpens their preparedness skills resulting in better classroom management and content delivery to learners. However, these findings contradict Ng and Feldman (2013) whose study found no significant relationship between increased teacher tenure and job performance.

Finally, on whether the teachers' current designation in their schools had an influence on their instructional process in Biology, 28(57.1%) of the teachers disagreed. However, the minority of the teachers; 9(18.4%) agreed with 12(24.5 %) being unsure. This implies that teachers' designation in schools they taught did not affect their effectiveness in teaching the Biology. This statement is supported by the study item's mean of 1.43 and standard deviation of 1.295.

This finding on the influence teacher's current designation at school had on students' learning achievement in Biology is inconsistent with the findings of studies by Irbil et al.

(2011) and MacIntosh (2013) as indicated by the reviewed literature. The two studies had demonstrated that teachers with high job designations were highly committed due to obvious restraints and posed good academic results in learners. The study findings also disagreed with the literature reviewed in this study by Chatzoglou et al. (2013) that argued that designation being expertise, qualification or teacher's rank at school usually determines job satisfaction or dissatisfaction thus enhancing teachers' productivity, effectiveness, and performance that results in improved learners' academic outcome.

The average mean and standard deviation for the influence of teachers' attributes of turnover on learning achievement in Biology is 3.01 and 1.292 respectively. This implies that Biology teachers' attributes significantly influenced the effectiveness with which Biology instruction process was conducted in public secondary schools in Garissa County. The researcher further conducted Pearson's Correlation Analysis to test the study hypothesis which stated:

H₀₁: There is no statistically significant relationship between the teachers' attributes of turnover and learning achievement in Biology

The hypothesis was initially tested using Pearson Product Moment Correlation at an alpha level of 0.05 and degrees of freedom of 47 (49-2). The *p* value and *r* value were used to establish the relationship between the study variable. It was purposely done to determine the strength and direction of the relationship between the independent variables and the dependent variable. The researcher's intention was to determine if there was any significant relationship between the teachers' attributes of turnover and the learning achievement in Biology in public secondary school in Garissa County. The teachers' attributes of turnover had a Mean = 3.01 and S.D = 1.292 while the learning achievement in Biology had Mean = 1.95 and S.D = 0.879. The computation output is as shown in the Table 4.

Table 4: Pearson's Correlation Analysis between Teachers' Attributes and Learning Achievements in Biology

		Teachers Attributes'	Learning Achievement in Biology
Teachers' Attributes	Pearson Correlation	1	.76**
	Sig. (2-tailed)		.000
	N	49	45
Learning Achievement in Biology	Pearson Correlation	.76**	1
	Sig. (2-tailed)	.000	
	N	49	49

From Table 4 above, the observed results ($r = 0.76$ $p = 0.000$) show a significant relationship between teachers' attributes of turnover intention and learning achievement in Biology. A correlation of $r = 0.76$ indicates a strong positive relationship between the two variables. The results

imply that the degree of learning achievement in Biology in public secondary schools in Garissa County is influenced by the specific teacher attributes of turnover such as teacher's gender, age, marital status, the level of education etc... The *p*-value of 0.000 is less than the alpha

level of 0.05. This provides evidence against the stated null hypothesis which is consequently rejected. The implication of this statement therefore, is that there is a significant relationship between the attributes of teachers' turnover and the learning achievement in Biology in public secondary schools in Garissa County. The study results show that the teachers' attributes of turnover were predictive factors for students' learning achievement in Biology. These findings are consistent with the

presentation of results characterized by the Human Capital Theory of Occupational Choice.

Finally, in order to establish the contribution of each predictor variable (specific determinants of teacher turnover intention) to the variation in the response variable (students' learning achievement in Biology), regression analysis was carried out and the results presented in Table 5.

Table 5: Regression Coefficients

Model	Variable	B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	1.032	.215		4.797	.000
	Teachers' Attributes	.211	.105	.520	2.015	.031

The general model equation from the results in Table 5 indicates teacher turnover factors based on attributes of teachers.

$$Y = 1.032 + .211X$$

Based on the study hypothesis:

H₀₁: There is no statistically significant relationship between the teachers' attributes of turnover and learning achievement in Biology

(t (47) = 2.02, p = .031 < .05) is significant, the null hypothesis 1 is thus rejected. The interpretation of this is that one unit change in attributes of teachers' turnover would cause a significant change of .211 or 21.1 % in learning achievement in Biology.

Implications to Research and Practice

The predictive determination of influence of teachers' attributes associated with turnover on learning achievement in Biology was the study's main objective. The study hence provides the government of Kenya, specifically the Ministry of Education and Teachers Service Commission with findings in relation to teacher turnover and their influence on student learning achievement. It is in view of this study that these findings assist the various education stakeholders in formulating comprehensive intervention strategies aimed at managing teacher turnover in learning institutions. Secondly, the findings provide in-depth understanding on the influence the limiting teacher attributes of turnover (gender, age, marital status, level of education and experience) relate with students' learning achievement in Biology.

5. Conclusion and Recommendations

5.1 Conclusion

The study found that the majority of the teachers of Biology were in agreement that their gender, age, marital status, teaching experience and designation in schools did influence the effectiveness of their instructional process in Biology class. This means that learning achievement in Biology in the study area was influenced by the individual teacher's characteristics as stated in the study.

Consequently, teacher's attributes of turnover had a moderate influence on students' learning achievement in Biology (M = 3.01, SD = 1.292). Similar findings recorded through qualitative data from the document analysis guide showing chronic teacher absenteeism, massive transfer requests, resignations, duty desertions and interdictions were majorly influenced by the individual teacher attributes of turnover.

Moreover, the information the researcher obtained from the value-added progress records, CAT marks in Biology and analyzed KCSE results records provided adequate information on the Biology teachers which concur with the quantitative data collected using the questionnaire. The two sets of triangulated data provided adequate evidence on the influence the teachers' attributes of turnover had on the learning achievement in Biology in public secondary schools in Garissa County. Further, both Pearson Product Moment Correlation and Regression analysis established that the teachers' attributes of turnover were significantly related to learning achievement in Biology in the study area (r = 0.76, p < 0.05). This implies that the departure of

these teachers affects the effectiveness of instructional process in Biology leading to low learning achievement.

5.2 Recommendations

1. Both Teachers' Service Commission (TSC) and the school administrators should come up with teacher retention strategies that address teachers' attributes. On gender, appealing retention strategies such as provision of adequate staff houses should be emphasized. With regard to teachers' age, robust mentorship programs for the young and newly employed teachers should be put in place to assist such teachers navigate smoothly in teaching profession.
2. The TSC should also manage transfer crisis and develop retention strategies that are appealing and consistent with the needs and desires of younger teachers such as reducing a mandatory five years period to three for newly employed teachers in Garissa County before one qualifies for transfer to other schools of their choice. Married teachers should be housed in schools or allowed flexible working hours to enable them commute.
3. Both the TSC and the school management should provide attractive support systems and allowances that commensurate with one's level of education to retain teachers of Biology in schools so as to enhance students' learning achievement in the subject.

Acknowledgement

This work is a product of the effort of several actors: My sincere gratitude goes to the Almighty God for the countless blessings. Secondly my special appreciation goes to Moi University. Equally, I am greatly indebted to my devoted university supervisors; Prof. Violet Oyata and Prof. Alice Yungungu whose diligent and tireless efforts saw this work to completion. In a special way, my heartfelt gratitude goes to my wife Mary Nakhungu and children; Vanessa, Terence, Reuel, Zawadi, Presley and Praise, whose love ignites in me the desire to persevere hard times, focus on the goal and stretch my abilities beyond any limit. They are my strength and the main reason I strive to be a better and productive individual. May the success of this study be a sense of their inspiration.

Declaration of Conflicting Interests

The author declares no potential conflicts of interest with regard to this study, its authorship, and/or publication of this article.

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