Impact of School Eye Care Intervention on Teachers' Productivity: A Case of Katsina State

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ARTICLE INFO	ABSTRACT
	This study evaluates how the Noor Dubai Foundation (NDF) School Eye Intervention affects the output of instructors in Katsina State schools. A five-point Likert questionnaire was used to gather primary data for the survey study design. The data was analysed using tables, graphs, and regression. The results revealed that 76.16% agreed that teachers' productivity has improved by improving the students' social well-being, and 86.55% agreed it was by recognising students' importance in the classroom. 86.00% agreed that it was through improved students' understanding in the classroom. 76.32% agreed that it was through improving teachers' students' motivation in the classroom. 63.64% agreed that it was by applying various teaching methods in the classroom. 77.97% agreed that teachers improved the effort of students' learning in the classroom. 84.25% agreed that it was done by enhancing the understanding of slow learners in the classroom. 80.70% agreed that it was through motivating students in the classroom. Lastly, 86.36% of participants agreed that after obtaining the NDF Eye Care Intervention in the State, instructors' productivity has increased as a result of supporting pupils in the classroom. Regression results revealed that teachers' productivity increased by 38.5% with eye treatment and spectacles rather than eye screening. This suggests that after obtaining eye care and spectacles, instructors' productivity has increased dramatically because of NDF School Eye Intervention. The consequence of the policy is that the realisation of schoolchildren's right to education is impacted by poor eye health. For sustained eyesight and high-quality education, the government should focus strongly on partnering and cooperating with the NDF on eye care interventions.

Keywords: Teacher's Productivity, School Eye Care, Vision, and Noor Dubai Foundation |

1 Introduction

Healthy eyes for teachers are linked to educational achievement, equal life well-being, and overall academic performance (Paudel, Phung, Kovai, Naduvilath, Ho, Giap & Holden, 2017). World Health Organisation (2022) indicates that worldwide, half of the cases of blindness are avoidable if early measures of intervention are given attention (American Optometry Association 2020). Vision impairment directly and indirectly affects teachers' productivity and their ability to impact knowledge to their pupils. Teachers spend the maximum time in classroom settings with their students (Paudel *et al.*, 2017). This compact learning environment can help teachers become important sources who observe changes in sight and eye health among their pupils. They also significantly promote eye health and prevent more severe diseases (Wilhelmsen & Felder, 2020). Visual acuity loss affects teachers' activities, such as readings and face recognition, as well as an individual's ability to enhance productivity. An eye intervention program must recognise these so teachers can productively impact their pupils. Global data from the World Health Organisation (WHO) (2022) show that an estimated 19 million children are visually impaired, and a substantial number are school-leaving children who require the attention of vision-impaired free teachers.

The World Health Organization (WHO) has also taken measures to promote the health of children's eyes via prevention, treatment, and rehabilitation (WHO, 2022). Several of the United Nations' Sustainable Development Goals (SDGs) also include these principles, especially Goals 3, 4, and 5, which focus on ensuring that people have access to decent healthcare, education, and employment opportunities regardless of gender. Goal 8 aims to promote economic development by providing decent employment; hence, they are essential to making that happen. Cost-effectiveness has been shown in recent research for programs to identify and treat Uncorrected Refractive Error (URE) in school-aged children (see Minto & Ho, 2017; Chung, 2021; Reddy & Basset, 2017; Liao, Xie, Zhang, Chen & He, 2018). Comprehensive eye care for school-aged children may be made possible via school-based initiatives (Minto & Ho, 2017; Reddy & Bassett, 2017; Liao et al., 2018), which would contribute to realising the SDGs.

Rabiu, Taryam, Yusuf, and Maji (2023) found a negative correlation between poor eye health, socioeconomic status, and quality of life. This highlights the need for eye care intervention provided by Noor Dubai Foundation for schools in Katsina state. These previous studies (Rabiu et al., 2023; Chung, 2021; Kovin, 2018; Liao et al., 2018; Minto & Ho, 2017; Reddy & Basset, 2017) did not take into consideration the influence of such eye treatment and prevention programs on the teachers' economic contribution which is the core contention of this research work. This paper argues that not only does eye care improve the welfare and students' performance, as highlighted in previous studies, but there is an indication that it could advance the performance of teachers as well. Improving the students' health would go a long way in enhancing teachers' performance. However, stormy eyes and vision among students would cause distractions to teachers by reducing their reasonable outputs, and that hampers the SDGs.

In response to the concern about visual impairments in Katsina State, the Noor Dubai Foundation began offering extensive and sustainable eye care services in the State in partnership with the Katsina State Government and other relevant non-governmental organisations. These include the introduction of the school eye program in the three main cities of the State at the first stage. These are Katsina LGA (49 Primary schools, 102,034 pupils), Funtua LGA (63 primary schools, 58,890 pupils; and Daura LGA (48 primary schools, 85,709 pupils). The school's eye health care program includes eye screening of primary school pupils in classes 1 to 6 of all public primary schools, a referral system, and optical services. Selected school teachers are trained to conduct the annual screening. Eye health education materials are disseminated. This program aimed at ensuring the blind and visually impaired return to quality and productive lives. Thus, there is an urgent need to assess the program's economic impact on teachers' productivity in Katsina State.

This research effort is motivated by many factors in accordance with the sustainable development goals (SDGs) and the Noor Foundation's vision of a future free from avoidable forms of blindness. The first is the need to assess how the school eye intervention affects teachers' productivity; the second is the requirement for a long-term school eye intervention programme in the State. In Katsina State, school eye health initiatives are narrowly focused and not integrated into school health initiatives. The Noor Dubai Foundation's eye intervention program in schools in Katsina State would bring sustainable health and education to the beneficiaries. The general objective of this research work is to assess the economic impact of Noor Dubai Foundation School eye health intervention on teachers' productivity for sustainable development in Katsina State. Considering the above, the specific objectives of the research include: (i) evaluate the impact of pupil eye screening on teachers' productivity in Katsina State; (ii) determine the impact of eye treatment and glasses of pupils on teachers' productivity in Katsina State; (iii) Assess the mediating effect of parents' occupation on the impact of eye intervention on teachers' productivity in Katsina State, and (iv) ascertain the mediating effect of family size on the impact of eye intervention on teachers' productivity in Katsina State.

In view of the above specific objectives, the following hypotheses are tested during the analyses:

H_{O1}: Eye screening of pupils has no significant impact on teachers' productivity in Katsina State.

H_{O2}: There is no significant impact of eye treatment and glasses of pupils on teachers' productivity in Katsina State.

H_{O3}: There is no significant mediating effect of parents' occupation on the impact of eye intervention on teachers' productivity in Katsina State.

H_{O4}: Family size does not significantly mediate eye intervention's impact on teachers' productivity in Katsina State.

Therefore, this paper contributes in several ways, using a 5-point Likert scale questionnaire to sidestep other techniques that suffer from many shortcomings. Using an Open Data Kit (ODK) reduces interviewer bias, which promotes openness and helps to monitor the data-gathering process. This offers first-hand knowledge from those who benefited from Katsina State's school-based eye health initiative. Secondly, the impact of the intervention in terms of school eye care and teachers' productivity indicators such as social well-being, recognition, ease of understanding, motivation, various methods, student efforts, guide to slow learners, encouragement, provision of support, and skill improvement. Thirdly, it helps Katsina State create a precise and trustworthy database for eye care services. Fourth, the influence of the NDF eye care programme on teachers' performance was measured in the article using regression analysis. Finally, the research will close the gaps in the bottom-top approach to policymaking.

This study is extensively anchored on the Health Belief Model (HBM) (Hochbaum, Rosenstock, & Kegels, 1952). The HBM is an effort to forecast health-related actions based on specific patterns of beliefs. Mckellar and Sillence (2020) support the idea that individual perception, modifying factors, and the likelihood of action are

the three main components motivating people to engage in health-promoting behaviours. A person's beliefs about their vulnerability, the severity of their sickness, and the significance of their health all have a role in how they experience illness. Modifying factors include demographics, how dangerous something seems, and signals to take action. Perceived advantages minus perceived obstacles to implementing the suggested health intervention is the probability of action. According to Janz and Becker (1984) and Rosenstock, Strecher, and Becker (1988), when these circumstances come together, they usually result in a reaction that increases the probability of that behaviour happening. If educators and pupils value eye health intervention and its benefits, they will find a way to avoid or deal with eye issues. In that case, they may be more motivated to participate, and that will boost their classroom efficiency.

The other sub-part of this paper includes methodology, which captures the data collection procedure and data analysis method. Section three emphasises results and discussion, while section four includes the conclusion and policy recommendation.

2 Methodological Notes

2.1 Data Collection Procedure

The study measures the school eye care interventions of Noor Dubai Foundation on school children teachers' productivity in Katsina State. Teachers' performance was measured in ten (10) parameters with the aid of a 5-point Likert scale survey instrument developed by the researchers. These include assessing improvement in social well-being, recognition, ease of understanding, motivation, various methods, students' efforts, guide to slow learners, encouragement, provision of support, and skill improvement. This instrument allows the respondents to express themselves with five different options. Such variations are instruments for regression analysis. The questionnaire usually involved comparing previous-term parameter performance before and after interventions.

The study's sample frame comprises 1,674 instructors and students with eye treatments and glasses. Of them, 1,256 students were given eye medicine, and 5 had an intervention, including spectacles. However, as an intervention, 410 school instructors were given spectacles. A survey research design was used for this study. The research received ethical clearance (clearance No. 662) from the Katsina State Ministry of Health.

2.2 The Sample Size and Techniques

As a result, the sample's number of instructors and students is chosen in proportion to their population. The Yamane (1967) sampling method was added to the Chung, Snitzer, Prioli, Pizzi, Zhang, and Levin (2021) and Rabiu, Taryam, Bashir, Muhammed, and Zidan (2022) sampling techniques to provide a sample size that roughly corresponds to the study population. As a result, 323 recipients made up the study's sample. Twenty-five (25) instructors were selected as the research sample, while 298 beneficiaries were chosen proportionately from school-age children.

Furthermore, the questionnaire was distributed using a multi-stage sampling approach. The State was split up into three cities in the first phase. In the second phase, 45 schools were chosen randomly from the beneficiary primary schools located across the cities. Using a rigorous random selecting approach, seven beneficiaries—five schoolchildren and two teachers—were selected from each school to receive eye treatments and eyeglasses in the third stage. To do this, every teacher and student who might benefit from this was named, and one sample was chosen every seven days to create the population's overall sample.

2.3 Model Specification

Regression analysis is used in this study to determine the effect of the NDF Eye Care Intervention on the productivity of Katsina teachers. As such, developing a model that requires estimation is essential. So:

$$TPY = F(NDF\ Eye\ Intervention) \tag{1}$$

Where TPY is the dependent variable, which stands for Teachers' Productivity. In this instance, the NDF intervention consists of eye screening and treatment exercises. Substituting the two elements into the equation, we have:

$$TPY = F(ESN, ETG) \tag{2}$$

Whereas ETG stands for eye therapy (which also involves the distribution of eyeglasses), ESN stands for eye health screening. When we express this equation econometrically, we get:

$$TPY = \alpha_0 + \beta_1 ESN_i + \beta_2 ETG_i + \mu_i \tag{3}$$

In this case, the error term (which is supposed to be normally distributed) is represented as μ_i, and the constant is α_0. To prevent over-parameterisation of the coefficients to be estimated, β_1 and β_2, the study intends to include two control variables derived from demographic data. Therefore, the family size (FYS) and the parent's employment (PTO) are considered. The choice of parents' occupation is significant in this research because a career or profession could reflect the quality of life of the pupil. Family size would also present the amount of care from parents. Less child caring could be envisaged in polygamy, and more child caring could be attributed to the nuclear family. Mckellar and Sillence (2020) have considered such demographic variables to be modifying factors, thus their inclusion in the model. As such, equation 4 is presented as follows:

$$TPY = \alpha_0 + \beta_1 ESN_i + \beta_2 ETG_i + \beta_3 PTO_i + \beta_4 FYS_i + \mu_i \tag{4}$$

2.4 Techniques of Data Analysis and Hypotheses Testing

Experts first examined and pretested the questionnaire design, and seasoned research assistants received language translation training to translate the questions into the receivers' native tongues. SPSS 27 was used for both the descriptive statistics and the inferential analysis. The Katsina State Ministry of Health granted the ethical authority, and respondents obtained consent prior to survey distribution. Interventions in school eye care in Katsina State may boost teacher productivity.

The paper evaluated the validity of the research instruments by using Cronbach Alpha to determine the reliability of each questionnaire item. In this regard, a pilot test was carried out initially. Also, all the returned questionnaire responses were used to determine the alpha and the outcome are presented in Appendix I. Correlation and Ordinary Least Square (OLS) were used to evaluate the hypotheses of the research following the method exhibited in Yusuf, Rabiu, Taryam and Azu (2023) and Musthofa, Nasikhin, and Hasanah (2023).

3 Results and Discussion

3.1 Demographic Analysis

This section commenced with the estimation of the data obtained. Macro-Excel and SPSS 27 were used to obtain, clean, code, and analyse each of the 323 administered questionnaires. Demonstrating the respondents' demographic data is the first step in analysing the results. It is essential to highlight the respondents' backgrounds, hence this demographic analysis. The responses of both teachers and pupils were merged since they answered the same questionnaire, and responses seemed similar and uniform (see Appendix I). These include parents' profession, gender, age, education level, and family size. These demographic variables are necessary since they could influence an individual's health beliefs (Mckellar and Sillence, 2020). HBM theory, proposed by Hochbaum *et al.* (1952) and reinforced in Rosenstock et al. (1988), believes that demographic factors are modifiers of individual health beliefs. Table 1 illustrates this, showing that around 53% of responders are masculine and 46% are feminine. The primary takeaway from this outcome is the inclusivity of the Noor Dubai Foundation's (NDF) eye interventions across the State.

According to the respondents' age-related demographic data, 52.64% of them are older than ten, and 33.75% are between the ages of five and ten. 12.38% of the responses were apparently older than 18 years old. This is not unexpected because the intended beneficiaries are in elementary grades 1 through 6. According to the level of education, about 27.23% of the respondents are in Primary 6, roughly 11.46% are in Primary 5, roughly 14.86% are in Primary 4, 11.46% are in Primary 3, and 25.39% are in Primary 2. Additionally, 7.74% of the respondents are teachers (see Table 1). These results imply that Katsina State elementary school students often have eyesight impairment. This study focuses on the primary school pupil and their teachers. Improving the health of these pupils is argued to improve the productivity of their teachers.

Table 1 Demographic Data on the Recipients of the School Eye Intervention

Demography	Class						
Categories	Primary 1	Primary 2	Primary 3	Primary 4	Primary 5	Primary 6	Teachers
Frequencies	6	82	37	48	37	88	25
Percentage (%)	1.86	25.39	11.46	14.86	11.46	27.23	7.74
Demography	Age				Family Type		Gender
Categories	1 - 5	5 - 10	10 - 15	18 & above	Nuclear	Extended	Male
Frequencies	4	109	170	40	236	87	174
Percentage (%)	1.24	33.75	52.64	12.38	73.07	26.93	53.87
Demography	Parent Occupation				Intervention		Gender
Categories	Civil Servant	Farming	Business	Others	Treatments	Eyeglasses	Female
Frequencies	103	18	80	122	307	16	149
Percentage (%)	31.89	5.57	24.77	37.77	95.05	4.95	46.13

Source: Author's Compilation, 2023 using SPSS 27.

The responder received either eye therapy or eyeglasses as an intervention. However, just 4% of the recipients said they had gotten eye care, compared to nearly 95% who said they had received eye therapy. On the other hand, around 31% of the participants stated that their parents work for the government. Comparatively, around 5% of respondents say their parents are farmers, roughly 24.77% say their parents are company owners, and 37% say they run different kinds of businesses. The beneficiary's types of families: According to the findings, 26% of the participants were from extended families. By contrast, the majority of people with visual impairments come from nuclear families, as shown by the fact that around 75% of the respondents were from

such households. However, just 4% of the claimants obtained eyeglasses, whereas almost 95% of them received eye treatment.

3.2 Analysis of the Questionnaire

First, the responses to the eye health screening exercise assessment are shown in Figure 1. According to Figure 1, 187 respondents strongly agreed that the NDF agents should visit their school to conduct eye health screenings (ESN1). Conversely, 135 answers attest to the same, suggesting that the NDF agents were there to carry out the eye screening examinations. The answers also reveal that 106 respondents confirmed, and 216 respondents strongly testified that NDF (ESN2) examined their eyes to ascertain their health status. Additionally, Figure 1 shows that NDF (ESN3) screened the eyes of other schoolchildren, with 179 respondents strongly agreeing and 133 agreeing. With 316 respondents overall confirming it, there was more evidence that NDF (ESN4) also screened the eyes of school instructors. Lastly, the replies revealed that educators had received training in conducting eye care screenings (ESN5). One hundred eighty-one (181) respondents strongly agreed with this, and 110 respondents agreed in general. One important study variable and intervention technique of the Noor Dubai Foundation is eye screening. These answers are necessary to meet the first and third goals.
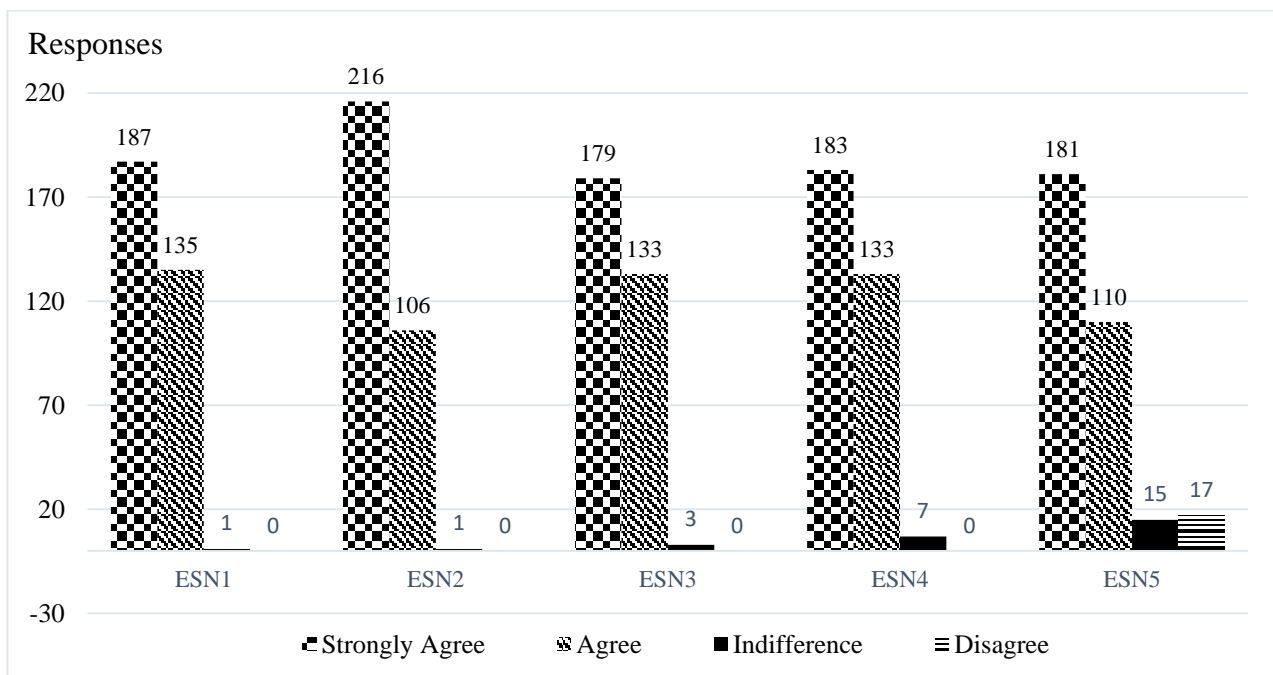

Figure 1 Response to School Eye Care Intervention
Source: Author's Compilation

Once again, the replies regarding eye care and eyeglasses were evaluated, and Figure 2 shows the outcome. The replies are essential to achieving this research's goals two and four, as shown in Figure 2. It makes up the variable for eye care and eyewear. Figure 2 shows that 171 respondents firmly confirm that they had gotten glasses or eye treatments from NDF (ETG1), and 32 respondents attest to the same, suggesting that treatment was provided after the screening process. On the other hand, 63 respondents disagreed, with 56 of them strongly disagreeing. Additionally, Figure 2 demonstrates that 171 respondents highly support using the eyeglasses or therapies that the ophthalmologist ordered (ETG2).

Comparatively, after the screening exercise, 32 replies showed that the patient was taking the medication as directed. On the other hand, 63 people disapproved, and up to 56 severely disapproved. Additionally, Figure 2 shows that follow-up treatments and tests were planned to track progress (ETG3), with 96 and 135 respondents agreeing and strongly agreeing. Once again, there was evidence that the glasses or therapies had improved teachers' productivity (ETG4), as confirmed by a total of 313 respondents. Lastly, the answer revealed that the eye treatments were also given to other students who had visual impairments (ETG5). One hundred thirty-five (135) respondents strongly agreed with this, and 188 respondents agreed with that statement.

Figure 3 presents the impact of school eye care intervention on teachers' productivity, which is the dependent variable of the research. In Katsina State, school eye care interventions may increase teachers' output. The higher the positive response, the more likely the positive impact will be. The indicators for measuring teachers' productivity are social well-being, recognition, ease of understanding, motivation, various methods, student efforts, a guide to slow learners, encouragement, provision of support, and skill improvement. Initially, the study looks at the respondents to see whether they have seen an improvement in their social well-being as a result of the school's eye care initiatives.
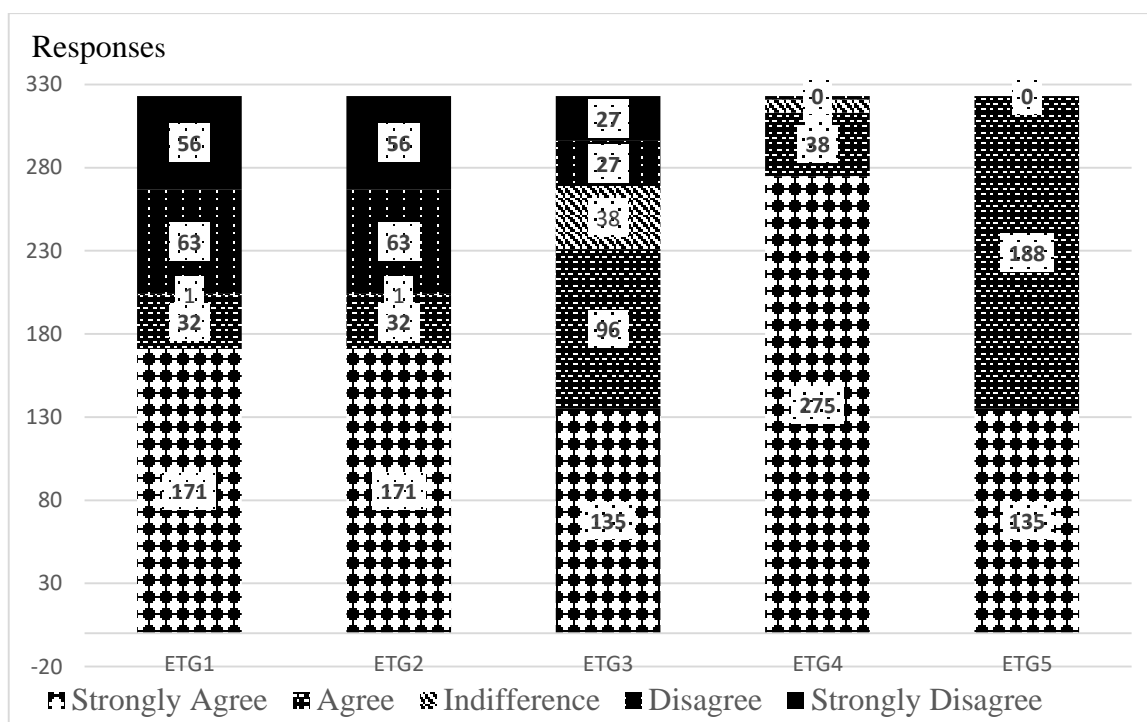
Figure 2 Response to Eye Treatments and Eyeglasses
Sources: Author's Compilation

Figure 3 shows that (n=151), representing 46.75%, strongly agreed to improvement in Teachers' productivity, while (n=168) 52.01% of the respondents agreed. There were 1.24% (n = 4) of respondents who expressed no opinion, and no respondent expressed disagreement in any form. The NDF school eye care intervention has enhanced teachers' social well-being, according to respondents (TPY1). With regard to recognition (TPY2), (n=119), 36.84% strongly agree, (n=159), 49.22% agree, and (n=19), 5.88% respondents are indifferent, and (n=36), 11.15% respondents disagree that school eye care intervention of NDF has improved their teachers' recognition as they see them as an essential part of the class. Again, based on Easy to Understand (TPY3), (n=115) 57.3% of respondents strongly agree, (n= 198) 32.8% agree, and (n=10) 8.7% respondents are indifferent that school eye care intervention of NDF has improved their level of understanding as their teachers now taught them in a way that is easy to understand. While we examined motivation by teachers (TPY4), (n=152) 47.06% of respondents strongly agreed, (n= 162) 50.15% agreed, (n=9) 2.79% were indifferent. However, (n=0) 0% disagreed that school eye care intervention of NDF has improved teachers' ways of motivating them as their teachers now encourage them to give their best effort in class. Equally, focusing on Various Methods (TPY5), there are (n= 143) 44.27% of respondents strongly agreed, (n= 174) 53.87% agreed. In comparison, (n=6) 1.86% were indifferent, and only (n=0) 0% of respondents disagreed that school eye care intervention of NDF has improved their teachers' adaptation to various cultural ideas in their teaching method. The result, as presented in Figure 3, further reveals that considering students' efforts (TPY6) there are (n=118) 36.53% strongly agreed, (n=198) 61.3% agreed, and (n=7) 1.17% respondents are indifferent, and (n=0) 0% respondent disagree that NDF school eye care intervention has improved their teachers' ability at recognising students' effort as their teachers now acknowledge student's effort through recognition and praise. With regard to guide to slow learners, (n=127), 39.32% of respondents strongly agreed, (n=180) 55.73% agreed, (n=16) 4.95% respondents were indifferent, and (n=0) 0% respondents disagreed that school eye care intervention of NDF have encouraged the ability of their teachers to guide students that are lagging academically. Once more, based on encouragement by the teachers, (n=114) 35.29% of respondents strongly agree, (n= 195) 60.37% agree, and (n=14) 4.33% respondents are indifferent that school eye care intervention of NDF has improved teachers' teaching approach to motivate students.

Yet again, we examined the provision of support by teachers; there are (n=88) 27.24% of respondents who strongly agreed, (n= 225) 69.66% who agreed, (n=10) 3.1% were indifferent. However, (n=0) 0% disagreed that NDF's school eye care interventions have improved how their teachers support all pupils. Finally, looking at skill improvement, (n=198) 61.3% strongly agree. In comparison (n= 110), 34.06% agree, and (n=15) 4.64% show indifference, but no one disagreed that NDF school eye care interventions had improved their teachers' teaching skills compared to the previous term and after receiving the eye care intervention in the State.
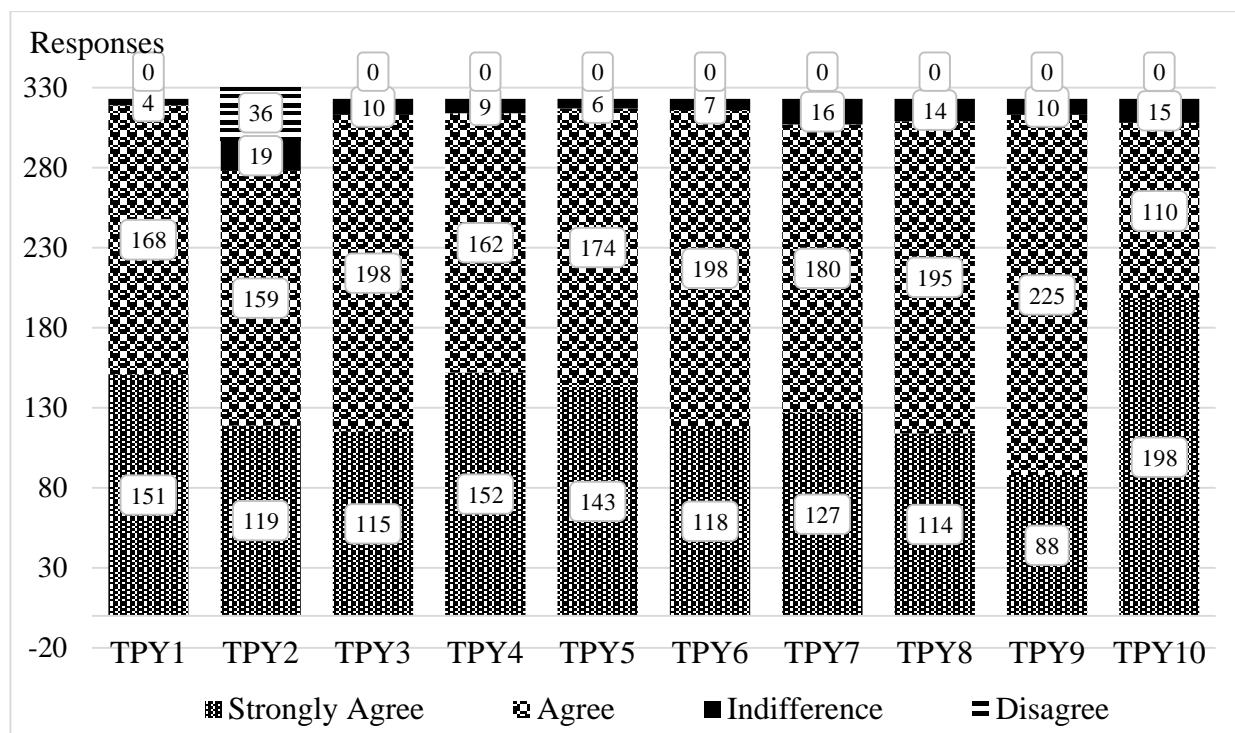
Figure 3 Response on Teachers' Productivity

Note: TPY1- Social Wellbeing, TPY2- Recognition, TPY3- Ease to Understand, TPY4- Motivating, TPY5- Various Method, TPY6- Student's Efforts, TPY7- Guide to Slow Learners, TPY8- Encouraging, TPY9- Provision of Supports, TPY10-Skill Improvement

Source: Author's Compilation

Table 2 Correlation Matrix and Reliability Statistics

Panel A: Inter-Item Correlation Matrix

Variables	PTO	FYS	ESN	ETG	TPY
PTO	1.0000	0.0076	0.2214	0.1943	0.2907
FYS	0.0176	1.0000	-0.3226	-0.3948	-0.1216
ESN	0.2214	-0.3226	1.0000	0.7737	0.5555
ETG	0.1943	-0.3948	0.7737	1.0000	0.7099
TPY	0.2907	-0.1216	0.5555	0.7099	1.0000

Panel B: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items	N
0.907	0.925	27	323

Sources: Authors Compilation 2024, Using SPSS 25

3.3 Hypothesis Testing

The pre-estimation and correlation results, which are presented in Table 2, opened this subsection. It illustrates how teachers' productivity and eye care/glasses use are related. It is evident from the inter-correlation matrix that there is little association between any of the independent variables. According to Azu, Jelivov, Aras, and Isik (2020), Azu and Nwauko (2021), and Yusuf et al. (2023), separate regression is advised for each correlated variable when the independent variables are highly adjusted. Therefore, as Table 2 illustrates, the outcome would imply that a single regression equation would be needed for the necessary estimation because multicollinearity is not anticipated to be a concern. The reliability test (Panel B) for the pertinent variable used in the study is shown in Table 2. The 33 items that made up our variables have a Cronbach's Alpha of 0.906, which is higher than the required minimum. As a result, both the pilot and the reported version of the questionnaire passed the reliability test. The appendix contains the individual item report.

The main goal of the hypothesis test is to quantify the impact of the NDF eye intervention on Katsina teachers' productivity using econometric methods. Table 3 reports the regression result. According to the R-Square, these independent factors could have a 55.3% impact on the dependent. Put differently, 55.3 per cent of the variation in teachers' output was explained by factors such as family size, parents' occupation, eye health screening, and eye treatment. According to the Durbin Watson (DW) statistic test, the statistical regression analysis's residuals show no autocorrelation. The value of 1.862, above 1.8, indicates no autocorrelation in the

sample chosen, which makes this clear. This indicates that the model fits the data effectively. Multiple regression estimation results are required to achieve this study's first and second objectives.

Table 3 Regression Estimation of the Impact of NDF School Eye Intervention on Teachers' Productivity

Variables	Unstandardised Coefficients		Standardised Coefficients	T-statistics	P-Value
	B	Std. Error	Beta		
(Constant)	0.5421	0.0914		5.9621	0.0000
PTO	0.0501	0.0145	0.1414	3.6601	0.0000
FYS	0.1768	0.0423	0.1747	4.2562	0.0001
ESN	0.0012	0.0588	0.0014	0.0134	0.9913
ETG	0.3846	0.0309	0.7518	12.317	0.0002
R-square	0.5545	Adjusted R Square	0.5475	Durbin-Watson	1.9262

Sources: Authors Compilation 2023, Using SPSS 27

The research's first task is to evaluate pupil eye screening's impact on teachers' productivity in Katsina State. The regression estimation reflects that eye health screening (ESN) has a coefficient of 0.001 but is not statistically significant. This shows a potential positive effect on teachers' productivity, though it is not statistically significant. Therefore, the first hypothesis (H_{O1}), "Eye screening of pupils has no significant impact on teachers' productivity in Katsina State," cannot be rejected. Thus, one cannot wholly affirm that eye health screening alone positively impacts teachers' productivity. However, this is the right step towards applying any treatment. Based on HBM theory (Mckellar & Sillence, 2020; Hochbaum et al., 1952; Rosenstock et al., 1988), pupils and teachers are more likely to participate in eye screening if they believe it could improve their learning and teaching conditions.

The second goal is to ascertain how teacher productivity in Katsina State is affected by students' eye care and glasses. A positive coefficient of 0.385 was found in Table 3's regression result for eye therapy and eyeglasses (ETG), which is statistically significant at 1%. This suggests that if all other factors remain constant, teachers' output will rise by 38.5% for every 1% increase in eye care and spectacles. Thus, it implies that eye care and spectacles enhance instructors' output in the field studied in this study. This is expected since both the pupils and teachers are beneficiaries of the NDF program in Katsina State. Therefore, the second hypothesis (H_{O2}): "There is no significant impact of eye treatment and glasses of pupils on teachers' productivity in Katsina State," is at this moment rejected. Eye screening alone could not improve teachers' productivity without eye treatment. This result reflects the outcome of Liao et al. (2018) and Rabiu et al. (2023), who saw a negative relationship between learning outcomes and eye problems.

The regression analysis also shows that teachers' productivity may be favourably impacted by their parent's employment and family size. Parents' profession is statistically significant at one per cent, with a coefficient of 0.050. That suggests that a parent's job may increase instructors' output by 5%, which implies that teachers perform better when their parents have successful careers. On the other hand, family size is statistically significant at one per cent and has a coefficient of 0.177. All other variables being equal, the assumption is that family size enhances teachers' occupation by 17.7%. These coefficients show that teachers are more productive when their parents are employed independently, but an extended family may be more effective in raising teachers' performance standards.

According to the third and fourth goals, the research also confirms that the influence of eye health screening, eye care, and eyeglasses may vary depending on the parents' work and family size. When combining these factors with eye health screenings and treatments, it may be possible to identify a mediating effect on parents' profession and family size. To do this, we engage with the relevant variables: first, the influence of eye health screening, eye treatment, and eyeglasses on parents' occupation. These demographic variables are necessary in line with Mckellar and Sillence (2020) since they could influence an individual's health beliefs. Also, the HBM theory believes that demographic factors are modifiers of individual health beliefs (Hochbaum et al., 1952; Rosenstock et al., 1988).

The findings of this study's third objective, which was to determine how parents' occupations could moderate the effect of an eye intervention on teachers' productivity in Katsina State, are shown in Table 4. Given that the given coefficients are statistically significant, Panel A of Table 4 demonstrates that parents' employment substantially affects the impact of either eye health screening or eye treatment and eyeglasses. First, after the interaction, the result of eye screening became positive and statistically significant (coefficient = 0.305 and significant at 10%). However, the reported influence of parents' occupation on the impact of eye screening is negative (coefficient = -0.105 and significant at 5%). This implies that there is a 10.5% mediating influence of parents' occupation on the impact of eye screening on teachers' productivity, which is negative. However, the interacting effect of parents' occupation on the impact of eye treatment is not statistically significant. Therefore,

the third hypothesis (**H$_{O3}$**), "There is no significant mediating effect of parents' occupation on the impact of eye intervention on teachers' productivity in Katsina State," is rejected at this moment. This attests to the reasoning of Mckellar and Sillence (2020), Janz and Becker (1984), and Rosenstock et al. (1988) that demographic variables could be modifying factors in the health belief model that anchored this research.

However, a relationship exists between family size and eye health screening, eye care, and eyeglasses. This is in line with the fourth goal, which is to determine how family size influences the effectiveness of eye intervention on the productivity of teachers in Katsina State. The outcomes are shown in Panel B of Table 4. Since the revealed coefficients are statistically significant, it indicates that family size might considerably regulate the impact of eye health screening, eye therapy, and eyeglasses. In the first case, eye health screening would increase instructors' output based on family size. Following the interaction between family size and eye health screening, family size continues to have a beneficial impact (coefficient = 0.229, but not statistically significant).

Table 4 Moderating Impact of Family Size and Parent Occupation on NDF Intervention Impact on Teachers' Productivity

Panel A: Parent Occupation on Impact on NDF School Eye					
	Unstandardised Coefficients		Standardised Coefficients		
Variables	B	Std. Error	Beta	t	P-Value
(Constant)	0.237	0.149		1.589	0.113
PTO	0.160	0.045	0.450	3.552	0.000
FYS	0.177	0.041	0.175	4.287	0.000
ESN	0.305	0.157	0.308	1.939	0.053
ETG	0.329	0.076	0.643	4.304	0.000
PTO*ESN	-0.105	0.051	-0.568	-2.069	0.039
PTO*ETG	0.018	0.025	0.157	0.732	0.465
Panel B: Family Size on Impact on NDF School Eye					
	Unstandardised Coefficients		Standardised Coefficients		
Variables	B	Std. Error	Beta	t	P-Value
(Constant)	0.405	0.207		1.958	0.051
PTO	0.044	0.013	0.125	3.311	0.001
FYS	0.229	0.168	0.226	1.361	0.175
ESN	0.733	0.172	0.742	4.266	0.000
ETG	-0.139	0.139	-0.272	-0.996	0.320
FYS*ESN	-0.572	0.125	-0.823	-4.554	0.000
FYS*ETG	0.456	0.127	0.902	3.598	0.000

Sources: Authors Compilation 2023, Using SPSS 27

On the other hand, there was a positive change in the eye health screening (coefficient = 0.733 and significant at 1%) and the consequent negative influence on the interacting variable (coefficient = -0.572 and significant at 1%). Consequently, the impact of eye health screening on teachers' productivity is adversely affected by family size. In other words, there is a 57.2% mediating influence of family size on the impact of eye screening on teachers' productivity, which is negative. Therefore, the fourth hypothesis (**H$_{O4}$**), "Family size does not significantly mediate eye intervention's impact on teachers' productivity in Katsina State," is hereby rejected.

Second, the size of the family, vision treatment, and spectacles would all increase teacher output. Following the interaction between family size, eye care, and eyeglasses, family size started to have a beneficial impact (coefficient = 0.229, but not statistically significant). Consequently, the interacting variable had a positive influence (coefficient = 0.456 and significant at 1%), whereas the effects of eye therapy and eyeglasses turned negative (coefficient = -0.139 but not statistically significant). Consequently, family size benefits how much instructors can do with eye care and spectacles. In other words, there is a 45.6% mediating influence of family size on the impact of eye treatment on teachers' productivity, which is positive. Again, the fourth hypothesis (**H$_{O4}$**), Family size has no significant mediating on the impact of eye intervention on teachers' productivity in Katsina State, is hereby rejected. Suggesting the need for comprehensive eye healthcare, as reasoned by Minto & Ho (2017), Reddy & Bassett (2017), and Liao et al. (2018), to realise the SDGs. These results further reinforced the reasoning of Mckellar and Sillence (2020), Janz and Becker (1984), and Rosenstock et al. (1988) that demographic variables could be modifying factors in HBM theory.

The research had some limitations; pre-intervention was only highlighted in the questionnaire since the research was conducted after the intervention program, which could be a potential source of bias. This research focused on only three local governments of Katsina State (Katsina LGA, Funtua LGA, and Daura LGA).

4 Conclusion and Policy Recommendations

This research underscores the multifaceted relationship between eye health interventions for pupils and teachers' productivity in Katsina State. The study employed a 5-likert scale survey method and multiple regression estimation. While initial findings suggest that standalone eye screening may not significantly influence teachers' performance, the provision of eye treatment and glasses for pupils emerges as a crucial factor in enhancing productivity among educators, similar to the findings of Liao et al. (2018) and Rabiu et al. (2023). Moreover, the study highlights the substantial influence of socioeconomic factors, such as parents' occupation and family size, in mediating the effectiveness of these interventions. This affirms the reasoning of Mckellar & Sillence (2020 that demographic factors are relevant to how individuals respond to health issues.

As such, policymakers and educational stakeholders are urged to prioritise holistic eye healthcare initiatives encompassing screening, treatment, and access to corrective measures for pupils. Addressing socioeconomic disparities is essential to ensuring equitable access to these interventions, thereby maximising their impact on teachers' productivity and overall educational outcomes. The Ministry of Health in Nigeria should seek collaboration to curb the negative influence of poor vision. It should seek more foundations to work with in nationwide eye screening and treatment for students and teachers. Moving forward, future research endeavours should delve deeper into the long-term implications of these interventions and expand their scope to encompass a broader geographic area, thus enriching our understanding of their efficacy and informing more targeted interventions for improving educational outcomes in similar contexts.

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APPENDIX

Appendix I Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Cities	55.6	158.65	0.88	0.90
Gender	56.3	176.17	0.03	0.91
Age	55.1	175.60	0.05	0.91
Class	53.6	171.12	0.07	0.92
Intervention	56.7	177.00	-0.05	0.91
PYO	55.1	167.70	0.23	0.91
FYS	56.5	180.15	-0.30	0.91
ESN1	56.3	167.08	0.73	0.90
ESN2	56.4	168.93	0.61	0.90
ESN3	56.3	167.15	0.70	0.90
ESN4	56.3	166.67	0.70	0.90
ESN5	56.2	165.91	0.49	0.90
ETG1	55.4	144.55	0.74	0.90
ETG2	55.4	144.55	0.74	0.90
ETG3	55.6	153.53	0.687	0.90
ETG4	56.6	175.64	0.07	0.91
ETG5	56.2	168.24	0.65	0.90
TPY1	56.2	167.08	0.70	0.90
TPY2	55.9	165.29	0.45	0.90
TPY3	56.1	165.37	0.81	0.90
TPY4	56.2	166.66	0.69	0.90
TPY5	56.2	169.45	0.51	0.90
TPY6	56.1	167.90	0.64	0.90
TPY7	56.1	166.00	0.71	0.90
TPY8	56.1	166.88	0.68	0.90
TPY9	56.0	167.31	0.72	0.90
TPY10	56.3	165.62	0.72	0.90

ETHICS STATEMENT
Ethical approval for the study was obtained from the Katsina state Ministry of Health (Approval No. 662).

CONFLICT OF INTEREST STATEMENT
The authors declare no conflict of interest.