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Maternal knowledge, perceptions and practices regarding screen exposure and visual health among under-five children in Ibadan, Nigeria: a cross-sectional study

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Abstract

Background

Screen exposure is now a routine feature of early childhood, yet evidence-based limits are difficult to implement where screens also function as educational tools, pacifiers and childcare supports. This study examined associations among maternal knowledge, perceptions and practices regarding screen exposure and visual health among under-five children in Ibadan North Local Government Area, Oyo State, Nigeria.

Methods

A community-based cross-sectional analytical survey was conducted among 420 mothers of children aged 0–59 months. A structured questionnaire assessed socio-demographic characteristics, knowledge of screen-time and eye-health recommendations, maternal perceptions and screen-regulation practices. Composite scores were categorised using modified Bloom cut-offs. Chi-square tests examined bivariate associations, and multiple linear regression assessed variables associated with maternal practice scores. Statistical significance was set at $p < 0.05$.

Results

The mean maternal age was 30.65 years (SD 6.39). Although 44.3% of mothers had fair knowledge and 28.6% had good knowledge, 64.3% had poor practices. Knowledge was associated with practices (chi-square = 128.287, df = 4, $p < 0.001$), perception with practices (chi-square = 184.366, df = 4, $p < 0.001$), and knowledge with perception (chi-square = 106.433, df = 4, $p < 0.001$). In adjusted regression, higher knowledge score (B = 0.992, $p < 0.001$) and perception score (B = 0.384, $p < 0.001$) were independently associated with higher practice score; socio-demographic variables were not significant after adjustment.

Conclusions

Knowledge and perception were strongly related to protective practices, yet poor practices remained common despite fair knowledge. The findings support practical, household-level screen-use and child eye-health interventions that combine eye-health literacy with feasible routines, parental self-efficacy, outdoor-play promotion and routine child eye-care access.

Introduction

Digital media exposure is now woven into the everyday ecology of early childhood. Smartphones, tablets and televisions are no longer occasional household devices; they are sources of entertainment, learning,

social contact and parental relief. Global recommendations, including those from the World Health Organization and the American Academy of Pediatrics, continue to emphasise that children younger than 2 years should avoid sedentary screen exposure except for video interaction, while children aged 2–5 years should have no more than about 1 hour daily of high-quality, preferably co-viewed content [1, 2]. These recommendations are clinically sensible, but they are also socially demanding: they ask families to regulate a technology that has become embedded in work, communication and domestic care.

The visual-health relevance of this issue has intensified. Recent evidence reports associations between screen exposure, near-work patterns and myopia risk in children and adolescents, although the strength of association varies by age, device type, study design and control of outdoor activity [6–9]. Digital eye strain is also increasingly recognised among young screen users, with systematic-review evidence suggesting that prolonged duration and poor viewing ergonomics are more defensible intervention targets than blue-light-filter products [7]. For preschool children, higher screen exposure may coincide with less sleep, outdoor play, caregiver-child interaction and visual behaviours that support healthy development [4, 5, 13].

Early childhood makes parental mediation especially important. Under-five children rarely regulate screen use independently; adults determine availability, timing, content, distance, posture and whether screens are used during feeding, tantrums or bedtime. Recent studies report that parental rules and restrictive mediation are associated with adherence to preschool screen-time recommendations, whereas passive co-viewing does not necessarily reduce exposure [11]. Qualitative syntheses also show that parents are not merely ignorant of possible harms; many experiences an unresolved tension between the educational promise of screens and the practical need to keep children occupied [12]. This tension is particularly important in settings where mothers combine childcare, paid work, household responsibilities and limited access to organised play spaces.

The Knowledge-Attitude-Practice (KAP) model remains widely used in public-health surveys because it offers a clear pathway: people first know, then form attitudes, then act. In child eye health, KAP instruments and reviews have demonstrated the value of measuring parental knowledge, attitudes and practices, but they also expose a recurrent problem: awareness of eye-health importance does not reliably translate into routine eye examinations, timely care seeking or preventive household behaviours [14, 15]. Behavioural theories such as the Health Belief Model and Theory of Planned Behaviour suggest why the KAP chain may break: perceived barriers, perceived behavioural control, subjective norms and competing benefits can be as influential as factual knowledge [10].

Evidence from Nigeria and other African contexts indicates that parents may recognise some child eye problems but still delay formal eye care or rely on misconceptions about when examinations are necessary [15, 16]. Evidence on African preschool screen routines and broader child development reviews also places sleep and developmental concerns in the same prevention conversation [17, 18], while pediatric eye-evaluation guidance underscores that early-childhood eye assessment should not depend only on a child's complaint [19]. However, less is known about how Nigerian mothers understand

and regulate screen exposure specifically as a child visual-health issue, especially for under-five children. This gap matters because interventions based solely on information campaigns may overestimate the behavioural power of knowledge and underestimate the household conditions in which maternal decisions are made. This study therefore examined maternal knowledge, perceptions and practices regarding screen exposure and visual health risks among under-five children in Ibadan North Local Government Area, Oyo State, Nigeria. The study was positioned not only to describe KAP levels, but to interrogate whether the assumed pathway from knowledge to protective behaviour holds in this context.

Methods

Study Design and Reporting

This was a community-based cross-sectional analytical study. Reporting follows the STROBE reporting framework for observational studies [20]. The design was appropriate for estimating the distribution of maternal knowledge, perceptions and practices and for testing associations among KAP constructs. Because exposure and outcome were measured simultaneously, all inferential findings are interpreted as associations rather than causal effects.

Study Setting

The study was conducted in Ibadan North Local Government Area, Oyo State, Nigeria. The setting is an urban to semi-urban environment characterised by increasing availability of smartphones, televisions and internet-enabled devices, alongside diverse maternal educational, occupational and household-income profiles.

Study Population and Eligibility

The target population comprised mothers with at least one child aged 0–59 months. Mothers were eligible if they were the primary or regular caregiver of an under-five child and gave informed consent. Mothers whose children were acutely ill at the time of data collection or who were unable to complete the questionnaire were excluded.

Sample Size Determination

The sample size was determined using the Leslie Kish formula for single-proportion studies:

$n = Z^2pq / d^2$

Where:

n = minimum sample size

Z = standard normal deviate at 95% confidence level = 1.96

p = estimated prevalence = 50% or 0.50

q = 1 - p = 0.50

d = margin of error = 5% or 0.05

Therefore:

$n = 1.96^2 \times 0.50 \times 0.50 / 0.05^2$

n = 384.16

To account for non-response, 10% was added:

10% of 384.16 = 38.42

384.16 + 38.42 = 422.58

The minimum required sample size was therefore approximated to 423 mothers. After data cleaning, 420 complete responses were included in the final analysis.

Sampling Technique

A proportionate stratified multistage sampling technique was used. Ibadan North Local Government Area was first stratified into its 12 political wards (as seen in Table 1). The sample was then allocated to each ward proportionate to its ward population using the formula:

$n_i = N_i / N \times n$

Where:

n_i = sample allocated to ward i

N_i = population of ward i

N = total population of all wards

n = total study sample size

Within each ward, households were selected systematically. A random starting point was identified, after which households were visited at regular intervals until the allocated sample for that ward was completed. In each eligible household, one mother with at least one under-five child was selected. Where

more than one eligible mother was present in a household, simple balloting was used to select one respondent.

Table 1
Proportionate allocation of the sample across wards in Ibadan North Local Government Area

Ward	Major localities covered	Ward population	Proportion of total population (%)	Sample
Ward 1	Beere, Kannike, Agbadagudu, Oke Are, Ode Oye	17,972	4.48	19
Ward 2	Oniyanrin, Ode Olo, Inalende, Oke Oloro	17,272	4.31	18
Ward 3	Adeoyo, Yemetu, Oke Aremo, Isale Alfa	61,683	15.39	65
Ward 4	Ituaba, Idi Omo, Oje, Igosun, Kube, Oke Apon	35,712	8.91	38
Ward 5	Bashorun, Oluwo, Ashi, Akingbola, Ikolaba, Gate	39,564	9.87	42
Ward 6	Sabo area	19,508	4.87	20
Ward 7	Oke Itunu, Coca-Cola, Oremeji	14,004	3.49	15
Ward 8	Sango, Ijokodo	29,587	7.38	31
Ward 9	Mokola, Ago Tapa, Premier Hotel area	10,115	2.52	11
Ward 10	Old Bodija, New Bodija, Secretariat, Awolowo, Obasa, Sanusi	71,484	17.83	75
Ward 11	Samonda, The Polytechnic Ibadan, University of Ibadan	47,020	11.73	50
Ward 12	Agbowo, Bodija Market, Oju Irin, Barika, Iso Pako, Orogun, Lagos-Ibadan Expressway	36,957	9.22	39
Total		400,878	100.00	423

Instrument Development and Adaptation

Data were collected using an adapted structured questionnaire with four sections. The questionnaire was adapted from WHO and AAP screen-time guidance, child eye-health KAP instruments, parental mediation literature and digital eye strain symptom frameworks [1, 2, 7, 11, 14]. Adaptation focused on making items understandable to mothers of under-five children, replacing technical clinical terms with

plain-language expressions, and emphasising actionable behaviours such as viewing distance, lighting, bedtime routines, screen-free periods, outdoor play and routine eye checks. Negatively worded perception and practice items were reverse-coded so that higher composite scores consistently represented more protective perception or healthier practice.

Validity and Reliability

Content validity was assessed through expert review in public health, health education and eye-health-related fields from the department of Health Promotion at the University of Ibadan. Face validity was assessed through pilot testing among mothers comparable to the target population. Internal consistency of the perception and practice scales was assessed using Cronbach's alpha, with alpha values of 0.87 gotten from the pretest of the instrument in Ibadan south (a location that is different from the actual study location).

Variable Measurement and Scoring

Knowledge items were scored as correct = 1 and incorrect or 'I do not know' = 0, producing a total score from 0 to 10. Perception items were scored on a 0–4 Likert scale after reverse coding where appropriate, producing a total score from 0 to 40. Practice items were scored so that healthier behaviours received higher scores, producing a total score from 0 to 20. Composite scores were categorised using modified Bloom cut-offs: poor (< 60%), fair (60–79%) and good (80–100%). Socio-demographic covariates included maternal age, marital status, education, employment, household income and religion.

Statistical Analysis

Data were analysed using SPSS version 25. Continuous variables were summarised using means and standard deviations; categorical variables were summarised using frequencies and percentages. Chi-square tests of independence examined associations between socio-demographic variables and knowledge category, and among knowledge, perception and practice categories. Effect sizes were interpreted using Cramer's V where possible. Multiple linear regression was used to assess variables independently associated with maternal practice score. Variables entered into the model were knowledge score, perception score, age of mother, tertiary education, household income above the study-defined minimum-wage threshold and government/private employment status. Statistical significance was set at $p < 0.05$.

Use of AI-assisted tools

During manuscript preparation, Claude AI-assisted tool were used to support language editing, manuscript structuring in accordance with BMC ophthalmology author guidelines, and citation formatting. All intellectual content, including the study design, data collection, analysis, interpretation of

findings, and conclusions, was produced by the authors. The authors take full responsibility for the accuracy and integrity of all content, citations, analyses, and declarations in this manuscript.

Results

Socio-Demographic Characteristics

As seen in Table 2, a total of 420 mothers were included. The mean age was 30.65 years (SD 6.39). Most respondents were aged 25–34 years (59.5%), married (80.2%) and had secondary or tertiary education (82.1%). Self-employment was the most common employment category (36.2%), followed by private-sector employment (29.3%). Slightly more than half of respondents reported household income above the study-defined minimum-wage threshold (56.2%). Christianity (54.8%) and Islam (42.6%) were the dominant religions.

Table 2
Socio-demographic characteristics of respondents (N = 420)

Variable	Category/statistic	n/Mean	%/SD
Age of mother	Mean (SD), years	30.65	6.39
Age group	18–24	63	15.0
	25–29	121	28.8
	30–34	129	30.7
	35–39	68	16.2
	40–45	39	9.3
Marital status	Single	36	8.6
	Married	337	80.2
	Separated/Divorced	36	8.6
	Widowed	11	2.6
Education	No formal education	22	5.2
	Primary education	53	12.6
	Secondary education	171	40.7
	Tertiary education	174	41.4
Employment	Unemployed	89	21.2
	Self-employed	152	36.2
	Government employed	56	13.3
	Private sector employed	123	29.3
Household income	Below threshold (< N77,000)	184	43.8
	Above threshold (> = N77,000)	236	56.2
Religion	Christianity	230	54.8
	Islam	179	42.6
	Traditional/Other	11	2.6

Maternal Knowledge Regarding Child Screen Use and Eye Health

Table 3 depict the mean knowledge score was 5.96 out of 10 (SD 2.32). Knowledge was strongest for the recommendation that children under 1 year should have no screen time (69.5%) and for avoiding

screen use in dark rooms (65.7%). Knowledge was weakest for the timing of a first comprehensive eye examination (47.9%) and the 20-20-20 rule (51.4%).

Table 3
Item-level maternal knowledge regarding screen use and eye health

Question	Option 1 n (%)	Option 2 n (%)	Option 3 n (%)	Correct n (%)	Wrong n (%)
Recommended screen time for children under 1 year	1 hour: 68 (16.2)	30 minutes: 60 (14.3)	No screen time: 292 (69.5)	292 (69.5)	128 (30.5)
Maximum recommended daily screen time for children aged 2–5 years	1 hour: 268 (63.8)	3 hours: 88 (21.0)	As much as desired: 64 (15.2)	268 (63.8)	152 (36.2)
Excessive screen time can cause myopia	Yes: 239 (56.9)	No: 113 (26.9)	I do not know: 68 (16.2)	239 (56.9)	181 (43.1)
Symptom of digital eye strain in a child	Frequent blinking/rubbing eyes: 255 (60.7)	Improved concentration: 74 (17.6)	Increased appetite: 91 (21.7)	255 (60.7)	165 (39.3)
Ideal screen distance from child's face	5–10 cm: 91 (21.7)	At least 30–40 cm: 239 (56.9)	Distance does not matter: 90 (21.4)	239 (56.9)	181 (43.1)
Blue light interferes with sleep-wake cycle	Yes: 260 (61.9)	No: 160 (38.1)	Not applicable	260 (61.9)	160 (38.1)
Purpose of the 20-20-20 rule	Eating 20 carrots: 97 (23.1)	Taking breaks from screens: 216 (51.4)	Sleeping 20 hours: 107 (25.5)	216 (51.4)	204 (48.6)
Screens in a dark room are more harmful than in a well-lit room	True: 276 (65.7)	False: 144 (34.3)	Not applicable	276 (65.7)	144 (34.3)
Age for first comprehensive eye examination	Before age 1: 201 (47.9)	Only at school entry: 90 (21.4)	Only if the child complains: 129 (30.7)	201 (47.9)	219 (52.1)
Prolonged screen use can lead to dry-eye symptoms	Yes: 258 (61.4)	No: 103 (24.5)	I do not know: 59 (14.0)	258 (61.4)	162 (38.6)

Maternal Perceptions

The mean protective perception score was 21.75 out of 40 (SD 9.66). As seen in Table 4, a substantial proportion of mothers perceived screens as necessary educational tools (47.9% agreed/strongly agreed), but 58.1% were worried about future eyesight and 60.0% reported difficulty controlling screen time in the current digital environment. More than two-thirds (68.1%) agreed that outdoor play was more beneficial for eye health than educational apps.

Table 4
Maternal perceptions regarding screen exposure and child eye health

Statement	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Screens are necessary educational tools for under-five children	57 (13.6)	67 (16.0)	95 (22.6)	107 (25.5)	94 (22.4)
I worry that current screen use will affect my child's future eyesight	34 (8.1)	45 (10.7)	97 (23.1)	105 (25.0)	139 (33.1)
Using a screen to keep a child quiet while I work is acceptable	68 (16.2)	72 (17.1)	107 (25.5)	83 (19.8)	90 (21.4)
It is difficult to control my child's screen time in today's digital world	34 (8.1)	46 (11.0)	88 (21.0)	98 (23.3)	154 (36.7)
Outdoor play is more beneficial for eye health than educational apps	14 (3.3)	46 (11.0)	74 (17.6)	101 (24.0)	185 (44.0)
Digital eye strain is a serious medical condition for toddlers	51 (12.1)	59 (14.0)	71 (16.9)	120 (28.6)	119 (28.3)
My own screen habits influence my child's device use	37 (8.8)	60 (14.3)	93 (22.1)	92 (21.9)	138 (32.9)
If content is educational, screen duration does not matter	86 (20.5)	85 (20.2)	108 (25.7)	77 (18.3)	64 (15.2)
I can recognise early signs of vision problems in my child	61 (14.5)	68 (16.2)	101 (24.0)	98 (23.3)	92 (21.9)
Eye check-ups are only necessary if the child squints or complains	62 (14.8)	88 (21.0)	101 (24.0)	82 (19.5)	87 (20.7)

Maternal Practices

The mean practice score was 7.57 out of 20 (SD 6.80), indicating weak protective screen-use practices (Table 5). Nearly half of mothers always allowed screen use during meals (46.4%), more than half used

smartphones/tablets daily to pacify tantrums (54.0%), and 77.6% had never taken their under-five child for a routine eye check-up.

Table 5
Maternal screen-regulation and child eye-health practices

Practice item	Option 1 n (%)	Option 2 n (%)	Option 3 n (%)
Allowing screen use during mealtimes	Always: 195 (46.4)	Sometimes: 128 (30.5)	Never: 97 (23.1)
Set screen-free period, e.g., 1 hour before bed	No: 226 (53.8)	Yes: 194 (46.2)	Not applicable
Using smartphone/tablet to pacify tantrum	Daily: 227 (54.0)	Rarely: 118 (28.1)	Never: 75 (17.9)
Actively monitoring or sitting with child during screen use	Never: 178 (42.4)	Sometimes: 112 (26.7)	Always: 130 (31.0)
Encouraging outdoor play to reduce screen use	Rarely: 168 (40.0)	A few times weekly: 126 (30.0)	Daily: 126 (30.0)
Adjusting brightness or using blue-light filters	No: 258 (61.4)	Yes: 162 (38.6)	Not applicable
Child using a device while lying down	Frequently: 206 (49.0)	Occasionally: 122 (29.0)	Never: 92 (21.9)
Taking away device after more than 30 minutes	Rarely: 196 (46.7)	Sometimes: 121 (28.8)	Consistently: 103 (24.5)
Routine eye check-up for under-five child	No: 326 (77.6)	Yes: 94 (22.4)	Not applicable
Setting parental controls or timers	No: 267 (63.6)	Yes: 153 (36.4)	Not applicable

Categorisation of Knowledge, Perceptions and Practices

Using modified Bloom cut-offs (as depicted in Table 6), 186 mothers (44.3%) had fair knowledge, 120 (28.6%) had good knowledge and 114 (27.1%) had poor knowledge. Perception scores were poor among 166 mothers (39.5%). Practices were predominantly poor: 270 mothers (64.3%) had poor practice scores and only 93 (22.1%) had good practices. These findings show a clear knowledge-practice gap.

Table 6
Categorised knowledge, perception and practice levels

Variable	Category	n	%
Knowledge	Poor	114	27.1
	Fair	186	44.3
	Good	120	28.6
Perception	Poor	166	39.5
	Fair	153	36.4
	Good	101	24.0
Practices	Poor	270	64.3
	Fair	57	13.6
	Good	93	22.1

Associations Between Socio-Demographic Characteristics and Knowledge

As seen in Table 7, the knowledge category was significantly associated with age group ($p = 0.049$), educational level ($p < 0.001$), employment status ($p = 0.048$) and household income ($p < 0.001$). Marital status and religion were not associated with knowledge. The strongest socio-demographic association was observed for education.

Table 7
Associations between socio-demographic characteristics and knowledge

Socio-demographic variable	Chi-square	df	p-value	Decision
Age group	15.550	8	0.049	Reject H01
Marital status	1.701	6	0.945	Do not reject H01
Educational level	76.012	6	< 0.001	Reject H01
Employment status	12.698	6	0.048	Reject H01
Household income	16.293	2	< 0.001	Reject H01
Religion	0.136	4	0.998	Do not reject H01

Associations Among Knowledge, Perception and Practices

Knowledge was significantly associated (as seen in Table 8) with the practice category (chi-square = 128.287, df = 4, $p < 0.001$; Cramer's V approximately 0.39). Among mothers with poor knowledge, 93.9%

had poor practices; among those with good knowledge, 52.5% had good practices.

Table 8
Association between knowledge category and practice category

Knowledge category	Poor practice n (%)	Fair practice n (%)	Good practice n (%)	Chi-square	df	p-value
Poor	107 (93.9)	5 (4.4)	2 (1.8)	128.287	4	< 0.001
Fair	130 (69.9)	28 (15.1)	28 (15.1)			
Good	33 (27.5)	24 (20.0)	63 (52.5)			

Table 9 shows that perception was significantly associated with the practice category (chi-square = 184.366, df = 4, $p < 0.001$; Cramer's V approximately 0.47). Poor practices were present in 95.2% of mothers with poor perception, whereas 61.4% of mothers with good perception had good practices.

Table 9
Association between perception category and practice category

Perception category	Poor practice n (%)	Fair practice n (%)	Good practice n (%)	Chi-square	df	p-value
Poor	158 (95.2)	6 (3.6)	2 (1.2)	184.366	4	< 0.001
Fair	95 (62.1)	29 (19.0)	29 (19.0)			
Good	17 (16.8)	22 (21.8)	62 (61.4)			

Knowledge was also significantly associated with perception (chi-square = 106.433, df = 4, $p < 0.001$; Cramer's V approximately 0.36). As seen in Table 10, good perception increased from 7.0% among mothers with poor knowledge to 50.8% among those with good knowledge.

Table 10
Association between knowledge category and perception category

Knowledge category	Poor perception n (%)	Fair perception n (%)	Good perception n (%)	Chi-square	df	p-value
Poor	78 (68.4)	28 (24.6)	8 (7.0)	106.433	4	< 0.001
Fair	73 (39.2)	81 (43.5)	32 (17.2)			
Good	15 (12.5)	44 (36.7)	61 (50.8)			

Factors Associated with Maternal Practice Score

The multiple linear regression model (as seen in Table 11) was statistically significant, F(6, 413) = 123.504, p < 0.001, explaining 64.2% of the variance in maternal practice score (adjusted R2 = 0.637). Knowledge score (B = 0.992, t = 8.941, p < 0.001) and perception score (B = 0.384, t = 14.425, p < 0.001) were independently associated with practice score. Age, tertiary education, household income above the threshold and government/private employment were not significant after adjustment.

Table 11
Multiple linear regression for maternal practice score

Predictor	B	SE	t	p-value
Constant	-7.097	1.173	-6.053	< 0.001
Knowledge score	0.992	0.111	8.941	< 0.001
Perception score	0.384	0.027	14.425	< 0.001
Age of mother	0.010	0.032	0.308	0.758
Tertiary education	0.062	0.459	0.135	0.893
Above minimum-wage threshold	0.430	0.425	1.013	0.311
Government/private employment	-0.373	0.431	-0.867	0.387

Model summary: R2 = 0.642; adjusted R2 = 0.637; F(6, 413) = 123.504; p < 0.001.

Discussion

This study found that maternal knowledge, perception and practice were significantly interrelated, and that knowledge and perception were independently associated with maternal practice score in adjusted regression, with the model explaining 64.2% of practice variance. This offers partial support for the KAP model, but it does not prove the simple pathway that knowledge automatically produces behaviour. The stronger test statistic for perception, and the persistence of poor practices among many mothers with at least fair knowledge, suggest that the decisive issue is not information alone but whether mothers believe control is possible and worth prioritising in the realities of childcare. This interpretation aligns with Jiang et al., whose integrated Health Belief Model and Theory of Planned Behaviour explained parental myopia-prevention intentions largely through perceived barriers, subjective norms and perceived behavioural control rather than knowledge alone [10]. The present findings therefore challenge the information-deficit model: education is needed, but education without household-level feasibility may be behaviourally weak.

The broader early-childhood literature supports this cautious interpretation. Longitudinal and systematic-review evidence links higher screen exposure or sedentary behaviour with developmental, physical-activity and sleep indicators in young children, while portable screen access has been associated with poorer sleep outcomes [21–25]. Neuroimaging evidence in preschool children also suggests that screen-based media use is related to markers of language and literacy development, although observational

designs still require careful interpretation [26]. These findings support practical limits and co-viewing guidance, but they do not justify deterministic claims about harm from any single screen exposure.

Parental mediation evidence is particularly relevant to this study. Reviews and observational studies indicate that young children's screen routines are shaped by household rules, caregiver modelling, home media environment, maternal workload and the use of devices during caregiving tasks [27–29]. This context helps explain why knowledge alone may coexist with poor practice: mothers may know recommended limits but still use screens to manage meals, work, tantrums or bedtime routines.

The mean knowledge score was moderate (5.96/10), but important gaps remained: only 47.9% knew that a first comprehensive eye examination should occur before age 1, and only 51.4% correctly identified the 20-20-20 rule. This pattern is consistent with recent child eye-health KAP literature showing that parents may know that vision matters while lacking actionable knowledge about when and how to prevent or detect problems [14, 15]. The weakness is not trivial. If a mother recognises that screens may be harmful but does not know when an eye examination should occur, knowledge remains abstract rather than operational. However, the evidence also warns against assuming that every incorrect response represents ignorance alone; some items, such as myopia risk and blue light, sit within an evolving evidence base where public messaging often overstates certainty. A high-standard intervention should therefore distinguish firm recommendations, such as limiting duration and promoting outdoor play, from commercially amplified claims, such as relying on blue-light filters.

Perceptions revealed a pronounced ambivalence: 47.9% agreed that screens are necessary educational tools, 60.0% found screen-time control difficult, and 41.2% accepted using screens to keep a child quiet while working. These results show why KAP studies must move beyond counting correct answers. Chong et al. described parents' screen-time decisions as a dilemma involving benefits, harms and practical pressures [12], while the AAP's 5 Cs framework similarly shifts attention from minutes alone to content, calming, crowding out and communication [3]. The present study strengthens that argument in a Nigerian maternal context: mothers are not simply choosing between knowledge and negligence; they are negotiating work, child soothing, educational aspiration and scarce alternatives. Still, the perception that educational content makes duration less important, endorsed by one-third of respondents, is analytically important because it converts a potential benefit into a rationale for unlimited exposure. That belief should be directly addressed in health education.

Maternal practices were poor overall: 64.3% fell into the poor practice category, 46.4% always allowed screen use during meals, 54.0% used a device daily for tantrum pacification, 42.4% never actively monitored use and 63.6% did not set parental controls or timers. These findings are consistent with preschool screen-time literature showing that routine rules and restrictive mediation are more strongly related to adherence than passive co-viewing [11]. Fitzpatrick et al. reported that parental restrictiveness was associated with later adherence to screen-time recommendations, whereas social co-viewing was associated with lower odds of adherence [11]. The implication is subtle: parental presence alone is not enough if the interaction endorses prolonged use. In this study, a practice-focused intervention would

need to help mothers build routines: no screens at meals, bedtime screen-free periods, short viewing blocks, device timers, alternative calming strategies and planned outdoor play.

The visual-health significance of poor practices should be interpreted carefully. Mothers showed moderate knowledge of myopia risk, yet nearly half reported frequent device use while the child was lying down and most had no routine eye check-up. Systematic reviews report associations between digital screen time, near work and myopia, while outdoor activity is consistently described as a protective behavioural context [8, 9, 30–34]. It would therefore be scientifically weak to infer from this cross-sectional study that screen use was responsible for visual morbidity among these under-five children. The stronger and more defensible conclusion is preventive: prolonged screen routines, poor ergonomics and reduced outdoor play may create a risk environment. This cautious framing is supported by digital eye strain reviews, which emphasise duration, breaks, viewing distance, lighting and ergonomic modification rather than overreliance on blue-light-filter products [7, 35–37].

Age, education, employment and income were associated with knowledge at the bivariate level, but age, tertiary education, income and employment were not independently associated with practice after knowledge and perception entered the regression model. This pattern cuts against a simplistic socio-economic explanation. Education and income may help mothers access information, but they do not necessarily solve the daily control problem once screens are embedded in childcare. The attenuation after adjustment suggests that cognitive and perceptual variables may be closer to practice than demographic position. Yet this should not be overread as proof that structural conditions do not matter. Income was measured as a binary threshold, employment was simplified and the analysis did not capture household crowding, access to safe outdoor spaces, maternal workload, childcare support or device ownership. Structural constraints may have been undermeasured rather than absent.

Routine child eye-care behaviour was particularly weak: 77.6% of mothers had never taken their under-five child for a routine eye check-up, and 39.5% agreed or strongly agreed that eye checks are necessary only if a child squints or complains. This result echoes child eye-health reviews showing that parental misconceptions commonly delay examination and treatment [15]. It also resonates with Nigerian evidence that parental awareness of eye disease does not always translate into timely eye-care seeking [16]. The critical issue is that many paediatric visual problems are asymptomatic or poorly verbalised by young children. Paediatric and preventive-service guidance supports vision assessment during early childhood, especially when risk factors, symptoms or parental concerns are present [19, 38, 39]. A symptom-triggered model of eye care is therefore inadequate for under-five children; it waits for the child to complain in precisely the developmental period when complaint may be absent or unreliable.

The study's theoretical contribution is that it treats KAP as a hypothesis rather than a slogan. The data support links between knowledge, perception and practice, but they also show that behaviour is not merely the final step in a neat cognitive sequence. Perception, barriers, norms and practical control appear central, consistent with the Theory of Planned Behaviour and Health Belief Model traditions [40, 41]. This is why the paper should not recommend awareness campaigns alone. A stronger intervention

model would combine maternal eye-health literacy with behavioural rehearsal, family media plans, reminders for routine eye checks, community messages that normalise outdoor play and practical tools such as timers and screen-free household zones. In other words, the task is not only to tell mothers what is right, but to make the healthier behaviour easier to perform repeatedly.

Strengths and Limitations

This study has several strengths. It focuses on under-five children, a group for whom screen-use habits are strongly caregiver-mediated. It also integrates knowledge, perception and practice rather than reporting awareness alone, and it uses both bivariate and multivariable analysis to test the explanatory value of KAP constructs. The inclusion of detailed item-level tables makes the findings useful for intervention design.

The limitations should be acknowledged. First, the cross-sectional design prevents causal inference; the results cannot establish temporal direction among knowledge, perception and practice. Second, all measures were self-reported and may be affected by recall and social desirability bias. Third, the analysis did not include residual diagnostics, formal mediation analysis or structural-equation modelling; therefore, mediation claims should not be made unless appropriate outputs are added. Fourth, the study did not include objective child eye examinations, screen-time logs, device-use tracking or environmental measures such as outdoor-light exposure. Finally, the study was conducted in one local government area, which may limit generalisability to rural or other Nigerian populations.

Implications for Policy and Practice

The findings support a shift from knowledge-only campaigns to practical, context-sensitive maternal support. Primary health-care clinics, early-childhood centres and community health educators should provide short, actionable guidance: no routine screens for children younger than 2 years; no more than about 1 hour daily of high-quality content for children aged 2–5 years; no screens during meals; no screens before bedtime; regular breaks; adequate lighting and viewing distance; daily outdoor play; and routine eye examination even when the child has no complaint. Messages should also address common rationalisations, especially the belief that educational content removes the need for time limits.

Conclusion

Maternal knowledge and perception were strongly associated with protective screen-use practices among mothers of under-five children in Ibadan North, Nigeria. Nevertheless, poor practices remained highly prevalent, indicating that information alone is not sufficient. The KAP model is useful as an organising framework, but the findings argue for a broader behavioural approach that addresses maternal beliefs, perceived control, household routines, childcare pressures and access to routine child eye care.

Abbreviations

AAP
American Academy of Pediatrics
AI
artificial intelligence
df
degrees of freedom
KAP
Knowledge-Attitude-Practice
NREC
National Research Ethics Committee
SD
standard deviation
SPSS
Statistical Package for the Social Sciences
STROBE
Strengthening the Reporting of Observational Studies in Epidemiology
WHO
World Health Organization

Declarations

Ethics approval and consent to participate

Ethics approval was obtained from the Oyo State Ministry of Health, Department of Planning, Research and Statistics Division (NHREC/OYOSHRIEC/10/11/22). The study was conducted in accordance with the Declaration of Helsinki. Informed consent was signed and obtained from all participating mothers before data collection.

Consent for publication

Not applicable. The manuscript does not contain identifiable individual-person data, images or videos.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

JSO conceptualized the study, developed the research proposal, obtained ethical approval, coordinated and supervised all stages of the research, conducted data management and statistical analysis, interpreted the findings, drafted the manuscript. KSPA contributed to study design, questionnaire development, field coordination, data collection supervision, interpretation of findings, and critical revision of the manuscript. OJA contributed to study design, literature review, data interpretation, and critical revision of the manuscript for important intellectual content. AAO contributed to data collection, quality assurance, statistical review, and manuscript revision. ETM contributed to the interpretation of findings, sociological contextualization of the results, and critical review of the manuscript. JSE contributed to methodological review, interpretation of results, manuscript editing, and overall quality assurance. All authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

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Availability of data and materials

The dataset used and analysed during the current study is available from the corresponding author on reasonable request, subject to institutional and ethical requirements.

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