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Knowledge, Attitudes, Practices, and Factors Associated with Care of Children with Autism Spectrum Disorders at a Tertiary Hospital in Kenya: A Mixed-Methods Study

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Abstract

Background

Autism spectrum disorder (ASD) is a lifelong neurodevelopmental condition whose outcomes are improved by timely recognition, family support, and coordinated multidisciplinary care. Healthcare providers are often the first professional contact for caregivers concerned about developmental differences, yet limited knowledge, uncertain attitudes, and inconsistent practices can delay diagnosis and intervention. This study assessed knowledge, attitudes, practices, and factors influencing ASD care among healthcare providers in paediatric services at Moi Teaching and Referral Hospital (MTRH), Eldoret, Kenya.

Methodology

: We adopted a sequential explanatory mixed-methods design. Quantitatively, a descriptive cross-sectional study of eligible healthcare providers involved in the care of children aged under fourteen years was conducted. A self-administered questionnaire captured sociodemographic characteristics, ASD awareness, knowledge, attitudes, and practice responses. Knowledge was summarized as percentage scores and categorized using Bloom's cut-off criteria. Qualitatively, focus group discussions and key informant interviews were conducted to better understand the quantitative findings. Quantitative data were analysed using R version 4.2.1, and qualitative data were analysed thematically using NVivo.

Results

Among 116 healthcare providers, 82 (70.7%) were female and the overall mean age was 38 years (± 6.6). All respondents had heard of autism, but only 25 (21.5%) had additional ASD training. Knowledge was good in 5 (4.3%), moderate in 73 (62.9%), and poor in 38 (32.8%) participants. The overall mean attitude score was 3.5, indicating a generally positive attitude, although negative attitudes persisted around early diagnosis and parents' ability to recognize symptoms. Fifty-five (47.4%) had participated in ASD care, but only 11 (20.0%) of these had used screening or diagnostic tools. Most referred children elsewhere for management, and referral challenges included lack of finances, lack of referral protocols, and caregiver unwillingness. Qualitative findings showed that knowledge gaps stemmed from inadequate pre-service and continuing education, limited training in diagnostic tools, absence of care protocols, weak multidisciplinary coordination, and poor links to community and educational support services.

Conclusions

Healthcare providers at MTRH demonstrated moderate ASD knowledge, generally positive attitudes, and variable practice. Strengthening undergraduate and in-service ASD training, introducing screening and

referral protocols, and improving multidisciplinary and community-linked care pathways may improve early recognition and management of children with ASD.

Introduction

Autism spectrum disorder is a neurodevelopmental condition characterized by persistent differences in social communication and interaction, together with restricted or repetitive patterns of behavior, interests, or activities[1]. Early recognition and intervention are important because developmental, educational, behavioural, and family outcomes are improved when children receive timely assessment, individualized support, and coordinated care[2]. In many low- and middle-income settings, children with developmental concerns may first encounter general healthcare providers who have variable training in neurodevelopmental conditions [3,4]. The knowledge, attitudes, and practices of these providers can therefore influence whether children are reassured, monitored, referred, or linked to appropriate services[5,6] .

In sub-Saharan Africa, ASD care is shaped by health-system capacity, community awareness, social stigma, and cultural beliefs about child development and disability[7]. Caregivers may seek help from multiple sources, including family networks, schools, religious or traditional systems, and healthcare facilities. Healthcare providers who lack confidence in developmental assessment may miss early signs, delay referral, or provide inaccurate reassurance[8]. Conversely, providers with adequate knowledge and supportive attitudes can help reduce stigma, promote early intervention, and connect families with available clinical, educational, and community resources.

Kenya has limited published evidence on healthcare provider knowledge, attitudes, and practices related to ASD care, particularly in tertiary referral settings where children with neurodevelopmental concerns may present through outpatient, emergency, inpatient, occupational therapy, speech therapy, neurology, or psychiatry pathways. Moi Teaching and Referral Hospital is a major teaching and referral facility serving western Kenya and neighbouring regions. Understanding the preparedness of healthcare providers in this setting is important for strengthening early recognition, referral, multidisciplinary coordination, and caregiver support.

This study assessed knowledge, attitudes, and practices regarding ASD among healthcare providers involved in paediatric care at Moi Teaching and Referral Hospital. It also explored factors influencing knowledge and practices to identify practical opportunities for improving ASD care in a Kenyan tertiary hospital setting.

Materials and methods

Study design

This was a sequential explanatory mixed-methods study conducted in two phases. The first phase was a descriptive cross-sectional quantitative survey. The second phase utilized a qualitative inquiry using focus group discussions and key informant interviews to explain and contextualize the quantitative findings. The mixed-methods approach was selected because provider knowledge, attitude, and practice can be measured quantitatively, while the underlying reasons for observed patterns require qualitative exploration.

Study setting and population

The study was conducted in paediatric services at Moi Teaching and Referral Hospital in Eldoret, Kenya. The study sites included paediatric outpatient clinics, paediatric wards, the paediatric emergency department, occupational therapy clinic, and speech therapy clinic. The hospital serves as a tertiary referral and teaching hospital for western Kenya and neighbouring regions. Eligible participants were healthcare providers directly involved in the care of children under fourteen years of age, including nurses, clinical officers, paediatric higher national diploma students, medical officers, paediatric residents, paediatricians, occupational therapists, and speech therapists.

Sampling and recruitment

A census approach was used to select 134 eligible healthcare providers in the paediatric department. A total of 116 healthcare providers were recruited and completed the quantitative survey. For the qualitative phase, participants were purposively selected to reflect relevant professional cadres and experience. Eight focus group discussions were conducted: three with nurses, three with clinicians, and two with doctors. Four key informant interviews were conducted with departmental or service leaders involved in paediatric, nursing, clinical officer, and occupational therapy services.

Data collection

Quantitative data were collected using a self-administered semi-structured questionnaire. The questionnaire captured sociodemographic characteristics, sources of ASD information, additional ASD training, knowledge of ASD, attitudes toward ASD, and practice responses to clinical scenarios. Knowledge items were adapted from previous ASD knowledge tools, including the Knowledge about Childhood Autism among Health Workers questionnaire and related published instruments. The attitude section included positively, and negatively framed Likert-scale statements adapted from prior autism attitude measures. The practice section included red-flag scenarios and questions on previous participation in ASD diagnosis, treatment, counselling, referral, and use of screening or diagnostic tools.

The questionnaire was pretested at Uasin Gishu County Hospital to assess clarity and relevance. Quantitative findings informed the development of qualitative guides. Focus group discussions and key informant interviews explored sources of knowledge, conceptual understanding of ASD, attitudes toward

children and caregivers, experiences in diagnosis and referral, use of tools, multidisciplinary care, barriers to practice, and recommendations for improving ASD care. Discussions and interviews were recorded, transcribed, translated where needed, and prepared for thematic analysis.

Data analysis

Quantitative data were summarized using frequencies, percentages, means, standard deviations, medians, and interquartile ranges as appropriate. Knowledge scores were calculated by assigning one point for each correct answer and zero points for incorrect or “do not know” responses, then converting total scores to percentages. Bloom’s cut-off categories were used to classify knowledge as good, moderate, or poor. Attitude responses were scored on a five-point Likert scale; negatively framed statements were reverse-coded so that higher scores consistently reflected more favourable attitudes. Associations between knowledge level and selected participant characteristics were assessed using chi-square, Fisher’s exact, or t-tests as appropriate. Qualitative recordings were transcribed, translated where needed, proofread, coded, and analysed thematically. Quantitative and qualitative findings were integrated during interpretation to explain patterns observed in the survey data.

Ethical considerations

Ethical approval

was obtained from the Moi University/Moi Teaching and Referral Hospital Institutional Research and Ethics Committee. Permission to conduct the study was obtained from hospital management. Written informed consent was obtained from all participants before questionnaire administration, focus group discussions, or key informant interviews. Participation was voluntary, and participants were informed that they could withdraw at any time. Participant identifiers were not recorded in the dataset; study codes were used to maintain confidentiality.

Results

A total of 116 healthcare providers participated in the quantitative phase. Participants were aged 25–58 years, with a mean age of 38 years (± 6.6). Most were female (82/116, 70.7%) and married (90/116, 77.6%). Nurses formed the largest professional group (44/116, 37.9%), followed by clinical officers (26/116, 22.4%), paediatric residents (15/116, 12.9%), paediatric higher national diploma students (11/116, 9.4%), paediatricians (10/116, 8.6%), medical officers (6/116, 5.2%), and occupational or speech therapists (4/116, 3.4%). Most participants worked in paediatric wards (59/116, 50.9%), followed by paediatric outpatient clinics (29/116, 25.0%) and the paediatric emergency department (25/116, 21.6%) as shown on Table 1.

Table 1
Socio-demographic characteristics of Healthcare Workers (N = 116)

Socio-demographic Characteristics		**n (%)**
Gender	Female	82 (70.7)
	Male	34 (29.3)
Marital Status	Married	90 (77.6)
	Single	19 (16.4)
	Separated	5 (4.3)
	Widowed	2 (1.7)
Designation	Nurse	44 (37.9)
	Clinical Officer	26 (22.4)
	Paediatric Resident	15 (12.9)
	Paediatric Higher National Diploma student	11 (9.4)
	Paediatrician	10 (8.6)
	Medical Officer	6 (5.2)
	Occupational/ Speech Therapist	4 (3.4)
Departments	Paediatric Wards	59 (50.9)
	Paediatric Outpatient Clinic	29 (25.0)
	Paediatric Emergency Department	25 (21.6)
	Occupational Therapy Clinic	2 (1.7)
	Speech Therapy Clinic	1 (0.9)

All participants reported having heard of autism. The most common sources of information were college, university, books, and media. However, only 25 participants (21.5%) reported additional training on autism spectrum disorder. Fewer than half of participants reported knowing ASD red flags. Among those who did report red-flag knowledge, most could identify at least two red flags, but some gave incorrect responses, suggesting that awareness did not consistently translate into accurate clinical recognition (Table 2).

Table 2
Autism Spectrum Disorder Awareness (n = 116)

Variable	Category	n	Proportion (%)
Heard about autism	Yes	116	100
Source of information (n = 116)	College	53	45.7
	University	50	43.1
	Media	38	32.8
	Books	42	36.2
	Relatives	7	6.0
	Other	8	6.9
Other sources of information on Autism (n = 8)	CME	1	12.5
	Friend with an autistic child	1	12.5
	Have a child with autism	1	12.5
	Colleagues	1	12.5
	Conference	1	12.5
	Friend	1	12.5
	Social media, journals	1	12.5
	Workplace	1	12.5
Additional training on autism	Yes	25	21.5
Spectrum disorders	No	91	78.5
Knowledge on ASD red flags	Yes	56	48.3
	No	60	51.7
Known Autism Red Flags (n = 56)	Known one	11	19.6
	Known at least two	37	66.1
	wrong response	8	14.1

The mean knowledge score was 8.15 out of 13 (± 1.7), equivalent to a mean percentage score of 62.7% (± 12.8). The median percentage knowledge score was 61.5% (IQR 53.9–69.2). Using Bloom's cut-off criteria, knowledge was classified as good in 5 participants (4.3%), moderate in 73 (62.9%), and poor in 38 (32.8%). Knowledge was strongest for social and communication impairment items and weaker for items related to ASD definition, causes, presentation, treatment, comorbidities, and sex differences in

diagnosis. There was no statistically significant association found between knowledge level and sex, marital status, employment duration, cadre, additional ASD training, or workstation. There was no statistically significant association between knowledge level and sex, marital status, employment duration, department, cadre, additional training, or workstation (Table 3).

Table 3
Summary statistics of knowledge scores and percentage knowledge scores

Score	**Min**	**Max**	**Median (IQR)**	**Mean (± SD)**
	2.00	**12.00**	**8 (7.00–9.00)**	**8.15 (1.70)**
Score Percentage	15.38%	92.31%	61.54 (53.85–69.23)	62.67 (12.80)

Attitudes were generally positive. The overall mean attitude score was above the neutral midpoint, and most respondents had mean attitude scores greater than 3. Participants generally rejected stigmatizing misconceptions such as ASD being equivalent to childhood schizophrenia or occurring only in children of highly educated parents. However, less favourable attitudes were observed around early diagnosis and parental recognition of symptoms. Some respondents agreed with statements implying that diagnosis before age four is difficult or impossible, and many did not believe that parents recognize ASD symptoms, both of which may contribute to delayed response to caregiver concerns (Table 4).

Table 4
Attitudes of HCP on Childhood Autism

Statement	Mean Likert score	Mode Likert score	Attitude
Negative Statements (5 = Strongly Disagree to 1 = Strongly Agree)			
Autism occurs in children born to parents with higher education	3.97	4	Positive
Autistic children grow up to be Schizophrenic adults	3.70	4	Positive
It is difficult to differentiate ASD from Schizophrenia	3.39	4	Positive
It is impossible to tell if a child has autism before the age of four years	2.84	2	Negative
Social withdrawal symptoms are due to cold, rejecting parents	3.22	4	Positive
Positive Statements (5 = Strongly Agree to 1 = Strongly Disagree)			
Autism predisposes children to social stigma	3.67	4	Positive
Autism leads to discrimination of affected children	3.96	4	Positive
There is a general negative view about autism spectrum disorders	3.98	4	Positive
Parents know symptoms of ASD	2.53	2	Negative
Autistic children need special education	4.28	5	Positive

Practice responses showed mixed preparedness. In clinical scenarios involving young children with ASD red flags, many participants selected further inquiry, referral, and follow-up as appropriate actions. Referral became more frequent as the scenario described an older child or more severe concerns. Among 55 participants who had previously participated in ASD care, only 11 (20.0%) had used screening or diagnostic tools. Most reported relying on general evaluation, and many referred children to specialists or occupational therapy services. Reported referral barriers included lack of finances, unwillingness of guardians, inadequate referral protocols, lack of specialists, stigma, traditional beliefs, and fear of expected outcomes (Table 5).

Table 5
Practices of ASD Management among HCPs

Diagnosis and Referral n = 55 (47.1% of HCP)	**n (%)**
Diagnosis & referral	37 (67.3)
Diagnosis, treatment & referral	18 (32.7)
Method of Diagnosis of Autism n = 55 (47.1% of HCP)	
General Evaluation	44 (80.0)
Screening and Diagnostic Tools	11 (20.0)
Screening & diagnostic tools used n = 11 (9.5% of HCP)	
CHAT	3 (27.3)
M- CHAT	2 (18.2)
ESAT	3 (27.3)
DSM-IV	6 (54.4)
DSM-V	6 (54.5)
Practices n = 55 (47.1% of HCP)	
Counsel on the ASD duration	46 (83.6)
Follow – up	35 (63.6)
Importance of Referral	53 (96.4)
Challenges in Referral	40 (72.7)
Counsel on timely referral to specialists	54 (98.2)
Challenges in Referral n = 40 (34.5% of HCP)	
Lack of finances	29 (72.5)
Unwillingness of guardian	21 (52.5)
Lack of referral protocol	18 (45.0)
Lack of specialists	5 (12.5)
Stigma	2 (5.0)
Traditional beliefs	1 (2.5)
Fear of expected outcomes	1 (2.5)

Qualitative findings helped explain the survey results. Participants described learning about ASD through college, medical school, clinical exposure, media, self-directed reading, and caregivers of children with ASD.

"From college ..more so from clinical practice ……it (Autism) was not covered deeply (in college), we did not go deep on it. Yeah, it was just an explanation..." (Nurse):

Many felt that ASD was covered superficially during training. Definitions of ASD varied, with some participants correctly describing it as a developmental or neurodevelopmental condition, while others referred to it as congenital or a form of mental retardation.

(Autism) is a congenital neurological disorder. It involves the development of the neurological system." (Clinical Officer)

Participants recognized delayed speech, poor eye contact, social communication difficulties, repetitive behaviors, rigidity, sensory differences, hyperactivity, and seizures as possible features or comorbidities, but they rarely discussed age of onset or functional impairment in detail.

"… the cause is not known … they (Reference materials and scholars) have not said (have never reported that) this is the cause (of ASD) …" (Paediatrics Resident)

The qualitative phase also showed that diagnostic practice was constrained by limited confidence and limited training in screening and diagnostic tools. Some participants believed diagnosis was only feasible after three years of age, and several stated that formal tools should be used only by specialists.

"*Three years (age for diagnosis autism), it is not easy to diagnose before, but more of suspicion, for diagnosis three and above…"* (Paediatrics Resident)

"The tools are there (ASD screening and diagnosis tools), but … before you can use a tool, you should be trained on how to use it. You cannot use (ASD screening and diagnosis tools) if you do not understand these parameters." …" (Paediatrics Resident)

Attitudes appeared to be shaped by knowledge, frequency of interaction with children with ASD, and empathy for caregivers.

"I think among paediatricians and psychiatrists, you will find that they have knowledge and positive attitudes compared to others like surgeons." (Paediatrics Resident)

*"….. the doctors and nurses, I feel that there is a knowledge deficit on autism; we depend so much on the Occupational Therapists to manage these children." (*Key informant interview for Nurse in-charge):

Participants described ASD care as requiring a multidisciplinary approach involving clinicians, occupational therapists, speech therapists, paediatricians, psychiatrists, schools, caregivers, and

community supports. However, they also described weak coordination across services, limited infrastructure, lack of protocols, and poor links to community and educational resources

"It (autism management) is a multidisciplinary approach, and again more of health education and counselling to concerned parties, from the guardians and parents…and also support in occupational therapy." (Paediatrics Resident)

"*We (HCP) refer (children with autism) to Paediatric neurologists; we have developmental paediatricians… then there are the general paediatricians, child psychiatrists, psychologists….occupational and speech therapists, also it depends on what they present with…*" (Paediatrics Resident)

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Discussion

This study found that healthcare providers working in paediatric services at Moi Teaching and Referral Hospital had universal awareness of ASD but limited formal training, moderate knowledge, generally positive attitudes, and inconsistent practice. The quantitative findings showed that only a small proportion had good knowledge, while qualitative findings suggested that much of the knowledge came from brief pre-service exposure, clinical encounters, media, or self-directed learning. These findings indicate that awareness alone is insufficient for confident early recognition, accurate counselling, or standardized care[9].

The moderate knowledge level observed in this study is important because healthcare providers are often the first point of contact for families concerned about developmental differences. Strengths in recognizing social and communication impairments suggest that many providers can identify some core features of ASD[10,11]. However, weaker understanding of causes, comorbidities, treatment, sex differences, and early diagnosis may affect clinical decision-making. Misunderstanding of sex differences is particularly relevant because girls may be under-recognized when clinicians expect ASD to present primarily in boys or when symptoms are less obvious [12,13].

Attitudes were broadly positive, but two areas require attention. First, the belief that ASD cannot be identified before four years may delay screening and referral, despite the importance of early recognition. Second, limited confidence in caregiver recognition may lead providers to minimize parental concerns. Qualitative data suggested that empathy and frequent interaction with children with ASD supported more favourable attitudes. Therefore, training should combine technical knowledge with caregiver-centred communication, stigma reduction, and practical exposure to children and families affected by ASD[14–16].

Practice was the most constrained domain. Although many providers selected referral as an appropriate response to red-flag scenarios, less than half had participated in ASD care and only one-fifth of those had used screening or diagnostic tools. Referral dominated practice, but referrals were affected by financial barriers, caregiver hesitancy, lack of protocols, and limited specialist availability. These findings

show that provider knowledge and attitudes are necessary but not sufficient. ASD care also requires a functional health-system pathway, including screening prompts, referral algorithms, multidisciplinary communication, family counselling, and follow-up mechanisms [17,18].

The qualitative findings highlight several practical improvement points. First, ASD content should be strengthened in undergraduate and diploma-level curricula for all cadres involved in child health. Second, continuing professional development should include early red flags, developmental surveillance, use of screening tools, caregiver counselling, and referral decision-making. Third, the hospital should develop a standardized ASD care pathway that clarifies roles for first-contact clinicians, paediatricians, occupational therapists, speech therapists, psychiatrists, psychologists, and social workers. Fourth, links with schools, caregiver support groups, and community services should be strengthened to support families beyond the hospital visit[19,20] .

Strengths and limitations

A key strength of this study is its mixed-methods design, which allowed quantitative estimates of knowledge, attitudes, and practices to be interpreted alongside provider explanations of training, diagnostic, referral, and system-level challenges. The study also included multiple cadres involved in paediatric care. However, the study was conducted in one tertiary hospital, which may limit generalizability to primary care, rural facilities, or private-sector settings. Self-administered questionnaires may be affected by social desirability bias. Practice scenarios may not fully reflect real clinical behaviour. Finally, some subgroup analyses may have been underpowered because certain cadres, such as occupational and speech therapists, had small numbers.

Conclusion

Healthcare providers at Moi Teaching and Referral Hospital demonstrated moderate knowledge of ASD, generally positive attitudes, and variable practices. Limited formal training, low use of screening and diagnostic tools, absence of standardized protocols, financial barriers, caregiver hesitancy, and weak multidisciplinary coordination affected ASD care. Strengthening ASD education, introducing practical screening and referral protocols, improving multidisciplinary coordination, and linking families to community and educational supports may improve early recognition and care for children with ASD in this setting.

Recommendations

The hospital should establish an ASD care protocol that includes red-flag recognition, screening, referral, documentation, caregiver counselling, and follow-up. Training institutions should strengthen ASD content in curricula for nurses, clinical officers, medical officers, therapists, and pediatric trainees. Continuing medical education should include practical sessions on screening tools and multidisciplinary

management. Finally, hospital-community linkages should be developed to connect families with special education, therapy, peer support, and social assistance services.

Declarations

Author Contribution

All the authors contributed equally to the publication of this study.

Data availability statement

Data are available on request.

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Competing interests

The authors declare no conflict of interest associated with conducting this study.

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