

Attention-Deficit/Hyperactivity Disorder Knowledge and Recognition Among Frontline Professionals in Ethiopia: A Study of Health Professionals and Primary School Teachers

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Research Article

Keywords: ADHD, Knowledge, ADHD recognition, Health Professionals, Primary Schoolteachers, Ethiopia

Posted Date: June 29th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10163790/v1>

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Additional Declarations: No competing interests reported.

Abstract

Objective

To measure attention-deficit hyperactivity disorder (ADHD) knowledge in healthcare professionals and primary school teachers, and the level of experience, to highlight the recognition of ADHD in Ethiopia.

Method

This study is a comparative/descriptive study conducted in five major cities located in southern Ethiopia from October to December 2023. Knowledge was measured using a validated tool named the knowledge of attention deficit disorders scale, after recruiting 139 health professionals (HP) and 230 primary school teachers (PST).

Result

Of the maximum possible score of 35, the median score on the rating scale in HP was 18.0 (51.4%, IQR, 15.0–20.0), whereas the median score in PST was 13.0 (37.1%, IQR, 10.0–15.25). Comparison of knowledge scores showed that among HP psychiatric nurses performed better, and among PST those teaching in grade 1–4th had higher scores. Involvement in evaluation, referral, diagnosis, or treatment of ADHD was correlated with higher knowledge (r , 0.18–0.30, p value, 0.04–<0.001). Similarly, teachers with experience in teaching children with ADHD performed better than their counterparts.

Conclusion

In this study, an inadequate level of ADHD knowledge was uncovered; experience determined more knowledge. However, the magnitude of experience identified was insufficient in relation to how common ADHD is in the population. Therefore, endeavours to improve the knowledge and recognition of ADHD among professionals involved in care provision are a priority.

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a childhood neurodevelopmental disorder that often persists into adolescence and adulthood. The American Psychiatric Association (APA), Diagnostic Statistical Manual (DSM-5), exclaims that a diagnosis of ADHD requires that symptoms lie further on a spectrum of what is considered normal for a neurotypical child (1). As such, ADHD cases can be easily misclassified, left unrecognized, or over-diagnosed depending on approach and the expertise level of the care provider (2).

Most developed countries have ADHD specific clinical guidelines to provide professionals with the appropriate clinical knowledge, decision-making ability, and a manual for communication of treatment options and assessment of the need for referral (3, 4). However, among primary care physicians (general practitioners), studies have shown inadequate knowledge, lack of interest, and confidence to evaluate and manage ADHD (5, 6). Moreover, despite the presence of enormous data to validate the seriousness of the diagnosis and long-term outcomes, ADHD is frequently subject to multifaceted controversy. This further creates apathy among healthcare professionals to engage in improving their knowledge and experience (2, 7, 8).

Research coverage of ADHD in developing countries has yet to advance (9). A systematic review of prevalence studies in sub-Saharan Africa indicated that the prevalence of ADHD reaches 5.4%-8.7% (10). This finding is consistent with a community-based prevalence studies conducted in Ethiopia (11, 12). This figure implies ADHD is as common as childhood asthma, a diagnosis that clinicians encounter daily, and yet there is no guideline for the management of ADHD for primary care centres in Ethiopia (13). Furthermore, to date, no published studies have evaluated health professionals' (HP) knowledge or perception regarding the condition.

Teachers play a pivotal role in the management of children with ADHD. Aware and informed teachers are at an advantage to early detect children who manifest symptoms of ADHD, since the school setting is an ideal environment where the child can be observed under conditions that demand focus and composure (14, 15). In addition, behavioural psychotherapeutic interventions given by teachers are effective if implemented with conceptual understanding, not to mention that better knowledge drives a favourable attitude during interaction with the child and parents (16–18).

Unfortunately, knowledge of the subject is moderate to unsatisfactory among teachers, according to several studies that measured knowledge of ADHD across developed and developing countries (19–24).

Previous studies that assessed knowledge mostly in developed countries have reported an accuracy rate between 45% and 75% using different measurement tools. Over time, assessment tools were being revised to avoid dichotomous options and lucky guesses, which resulted in a drop in knowledge score (16). This instance was observed after publication of the study by Sciutto, et al, which, under comparable situation reduced the accuracy rate (15). The drop in score was explained by the addition of the “I don't Know” option. The knowledge measurement tool developed by this author named, “the Knowledge of Attention Deficit Disorders Scale (KADDs)” was appraised as the most reliable and valid of the knowledge assessment scales, with a Cronbach's alpha of ($\alpha = 0.38-0.92$), test–retest reliability ($r = \frac{1}{4} 0.59-0.76$), and criterion validity ($r = 0.23$), in a recent systematic review (14).

In Ethiopia, few studies have attempted to measure ADHD knowledge among schoolteachers. The studies reported a considerable lack of information among teachers, and efforts to improve knowledge and create a school environment where children are well accommodated and cared for were negligible (25). There was a disparity in the measure of knowledge detected among primary school teachers (PST) in previous studies conducted in Ethiopia (26, 27). The level of experiences teachers have in teaching

children with ADHD and their involvement in symptom rating and treatment of children with ADHD could provide insights into the magnitude of recognition rate of children with ADHD in their classrooms. Previous studies conducted in Ethiopia do not provide adequate information on this topic.

In recognition of the inevitable consequences of neglect in Ethiopia, including the range of misinformation that could easily seal the present disregard, this research aimed to measure the level of knowledge and experience that is present among Ethiopian HP and PST in major cities in southern Ethiopia and provide an overall reflection on the recognition rate of ADHD.

Methodology

Study Design and Setting

A cross-sectional comparative study was conducted to measure HPs' and PSTs' knowledge of Attention-Deficit Hyperactivity Disorder (ADHD) and describe their experiences and exposure to children with ADHD. The study was conducted in five major cities in southern Ethiopia, namely Hawassa, Dila, Wolayta-Sodo, Hosanna, and Ariba-Minch, from October 2023 to December 2023. These five cities are located in different regions and represent a population of multiple ethnic groups and languages spoken; however, livelihoods are founded on closely resembling cultural and traditional values (28). There are seven hospitals in all five cities. In all, except for one comprehensive-specialized hospital located in Hawassa, GPs serve as frontline physicians. It was estimated that in these six hospitals, a total of 254 GPs and 45 psychiatric nurses are employed. Of the total psychiatric nurses.

In the Ethiopian educational system, primary school used to take place in two cycles, grade 1–4 and 5–8. This was revised to adopt a new single elementary school cycle of grade 1–6., which became effective in 2023. Nearly 91% of children join primary school by the age of 7 according to the Ministry of Education. (29) It is estimated that only 10% of children enrolled in primary education attend private schools (30).

Sampling Technique and Study Participants

The sample size of HP and teachers (PST) needed to achieve a 0.05 margin of error, considering a 95% confidence interval and an expected knowledge prevalence of 15.4% and 14.3%, respectively, was determined to be 121 HP and 197 PST. The desired rate was calculated based on a previous study conducted in Indonesia. The cut-off point above 75% describes the presence of good knowledge (20). A final sample size of 140 HP and 230 PST was computed after assuming a 15% nonresponse rate. This study was supervised and approved by the Department of Public Health and Clinical Nutrition at the University of Eastern Finland. Ethical clearance was obtained from Sidama Public Health Institute, Research Ethical Review Committee, an office that operates under the regional health bureau of Sidama, Ethiopia, on 18.10.2023. Informed consent was obtained from each participant.

A total of 139 HPs, comprising 51.8% GPs, 24.5% medical interns, and 23.7% psychiatric nurses, were recruited using a convenience sampling method. An online survey prepared and published on 12.10.2023 was the primary data collection method used to reach HP. This was followed by a paper format due to an inadequate response rate. 230 PSTs were sampled from primary schools in Hawassa city using multi-stage cluster sampling. There are 85 schools in Hawassa, out of which 23 are governmental and 62 are private, as per the data acquired from the Hawassa city administration office. A 2:1 governmental to private school ratio, identified during the pretest, was used to randomly select schools after further stratifying the schools by the districts wherein they were located. All teachers from the selected schools were invited to participate.

Measurement

An online survey and self-completed paper questionnaires were used to collect data from HP. On the other hand, a translated and pretested Amharic version of the same questionnaire was used to collect data from teachers via face-to-face interviews. The survey contained no subject identifiers and sought no sensitive information. Respective data protection procedures were followed during data processing.

The knowledge of attention deficit disorders scale (KADDS)

KADDS was originally published in 2000. It is a widely used knowledge assessment tool tested in twelve different populations (14). It consists of 18 positive and 18 negative statements, and it was the first tool to provide the “I don’t know” option, possessing the ability to differentiate misconception from lack of information. It is also the first tool to consider other behavioral disorders that often co-occur with or are mistaken for ADHD, such as oppositional defiant disorder (ODD) or conduct disorder (CD) (24).

There are a total of 36 items in the scale originally, comprising 3 subscales. Fifteen items measure knowledge of the nature and course of ADHD, 9 items measure knowledge of symptoms and diagnosis, and 12 items measure knowledge of treatment. In this study, fourth item stating “children with ADHD are more compliant with their fathers compared to their mothers” was excluded from the general knowledge subscale because of recent studies that argue against the validity of the statement (31, 32). Hence, the survey in this study includes 35 items, which is the maximum possible score on the scale. Internal consistency of the total measurement scale was lower for the HP survey, (Cronbach's alpha, 0.824) than for the teachers’ survey (Cronbach's alpha, 0.867). The component subscales were highly correlated with the total scale (r , 0.710–0.810).

Measures of ADHD related experience

ADHD related experience was defined in HP as experience in clinical encounters, involvement in the evaluation, diagnosis, referral, and/or management of children with ADHD. In addition, HP’ claims of having counselled someone about ADHD and having specific training on ADHD were assessed. On the

other hand, teachers' experience regarding ADHD was defined as having taught a child diagnosed with or displayed symptoms of ADHD and/or having the initiative to notify a parent or refer the child with symptoms of ADHD for a check-up.

Statistical Analysis

Analysis was conducted starting with data transformation and recoding of answers. Right answers were coded 1, whereas wrong answers or "I don't know" answers were coded 0. Then, the total score and subscale scores were calculated for each participant. Frequency analysis and descriptive analysis were performed to describe the demographic characteristics and experiences of the participants with ADHD and to explore the most common misconceptions, "wrong answers," and gaps of knowledge, "I don't know" answers.

Central tendency for total and subscale scores is presented as median and interquartile range. The frequency distribution of the total score was used to determine the cumulative percentage of participants with scores below each quartile of the maximum possible score. The proportion of participants in each quartile range is presented. Normality distribution was tested using Kolmogorov-Smirnov test of normality. Because the total score was not normally distributed, all comparisons are performed using nonparametric tests to exhibit differences in scores between character subgroups and subscales. Results of subscale scores were compared using Friedman's two-way analysis of variance test; Independent-Samples Mann-Whitney U test was used to compare variables with two categories; and Independent-Samples Kruskal-Wallis test was used to compare variables with three or more categories. Spearman's Correlation was performed to test for further relations between experience and total score. All analyses were conducted using statistical software, SPSS version 29.

Results

Participants Characteristics

Of the recruited HPs, 72.6% were between the ages of 26 and 35, and 77.0% were males. Half of the participants had work experience of one year or less. There were comparable numbers of participants from all five cities; however, 70% of the psychiatric nurses were sampled from Dila, and 50.4% of GPs were represented from Hawassa and Hosanna cities. Sociodemographic characteristics (SDC) of participants are presented in Table 1. About half, 52.2% PSTs recruited were females, 43.5% were between the ages of 26–35, and 32.6% were between the ages of 36–45. Two-thirds of the teachers have completed their first degree, and only 7.4% had a postgraduate degree. The mean years of work experience was 12.15 (SD, 7.7), and 50.4% indicated that they worked in a private school.

Table 1
Sociodemographic characteristics of study participants

Sociodemographic Characteristics	Categories	Frequency (%)
Healthcare Professionals		
Age	18–25	26 (18.7)
	26–35	101 (72.6)
	36–45	12 (8.6)
Gender	Female	32 (23.0)
	Male	107 (77.0)
Profession	General Practitioner	72 (51.8)
	Intern	34 (24.4)
	Psychiatric Nurse	33 (23.7)
Place of work	Arba Minch	26 (18.7)
	Dila	25 (18.0)
	Hawassa	38 (27.3)
	Hossana	32 (23.0)
	Sodo	18 (13.0)
	Total	139 (100)
Primary School Teachers		
Age	18–25	32 (13.9)
	26–35	100 (43.5)
	36–45	75 (32.6)
	> 45	23 (10.0)
Gender	Female	120 (52.2)
	Male	110 (47.8)
Highest Level of Education	Diploma/Certificate	50 (21.7)
	Bachelor's Degree	163 (70.9)
	Postgraduate	17 (7.4)
School Type	Private	116 (50.4)
	Governmental	114 (49.6)

Sociodemographic Characteristics	Categories	Frequency (%)
Grade You Teach	1st-4th Grade	80 (34.8)
	5th-8th Grade	150 (65.2)
Total		230 (100)

Result of the Knowledge of Attention Deficit Disorder Scale

The average total score and subscale scores are presented in Table 2, and Fig. 1 illustrates the distribution of participants' performance on the scale. The total score median in HP was 18.0 (IQR: 15.0–20.0), i.e., 51.4% knowledge rate. Of the total participants 43.8% rated between 25% and 50%, and 51.8% rated between 50% and 75% on the scale.

Table 2
Result of the KADDS knowledge rating scale, total and subscale scores

Descriptives		N ^a	Median	Percentage of total	Interquartile Range	Cronbach's alpha ^b
Health Professionals (N = 139)						
Total score		35	18.0	51.4	15.0–20.0	0.824
Subscales	General Knowledge	14	6.0	42.8	4.0–7.0	0.614
	Knowledge of Symptoms and diagnosis	9	7.0	77.7	6.0–8.0	0.591
	Knowledge of Treatment	12	5.0	41.6	4.0–7.0	0.630
Primary School Teachers (N = 230)						
Total Score		35	13.0	37.1	10.0-15.25	0.867
Subscale	General Knowledge	14	4.0	28.5	2.0–5.0	0.750
	Knowledge of Symptoms and diagnosis	9	6.0	66.6	5.0–7.0	0.707
	Knowledge of Treatment	12	3.0	25.0	1.0–4.0	0.735
<p>a The column heading N represents the maximum possible score for the total scale and subscales</p> <p>b Represents result of reliability analysis where results above 0.700 signifies strong internal consistency.</p>						

The median score in PST was 13.0 (IQR: 10.0-15.25), i.e., 37.1% knowledge rate. The percentage of teachers who scored less than 25% on the scale was 17.4%, and 69.1% of participants' scores lie between 25% and 50%. On the scale, only 13.5% scored more than half, and none of the teachers were able to score more than 75%.

In pair-wise comparison, knowledge of symptoms was higher (77.7%) than both knowledge of treatment (41.6%) and general knowledge of ADHD scores (42.8%), p value < 0.001 , among HP. The distribution of subscale scores among teachers produced a statistically significant difference (p value, < 0.001) across all subscales, with respective average scores of 66.6%, 25.0%, and 28.5%.

ADHD related Experience and Differences in ADHD Knowledge

The level of experience and all comparisons performed to test for differences in knowledge are presented in Table 3. Among HP, 48% had encountered a child with symptoms of ADHD, while 33.8% were involved in the evaluation and diagnosis, 33.0% had referred a child to a specialist, and 24.5% were actively involved in management. Having one of these experiences correlated significantly with total score, (r 0.172–0.299, p value 0.04– <0.001). Total score and years of work experience also showed a weak but positive relationship (r 0.2, p value = 0.03). Psychiatric nurses scored higher than GPs and medical interns, p -value 0.029.

Table 3
Comparison of ADHD knowledge across SDC and levels of experience

Variables		Frequency (%)	Total Score Median (IQR)	P value (Nonparametric AOC ^a)
Healthcare Professionals				
Healthcare Professionals (biodata)	Total	139 (100)	18.0 (15.0–20.0)	
Age	18–25	26 (18.7)	17.0 (12.75–18.25)	0.08
	26–35	101 (72.6)	18.0 (16.0–20.5)	
	36–45	12 (8.6)	18.0(16.5–20.75)	
Gender	Female	32 (230)	18.0 (15.0–20.75)	0.66
	Male	107 (77.0)	18.0 (16.0–20.0)	
Profession	General Practitioner	72 (51.8)	18.0 (15.25–20.0)	0.029
	Intern	34 (24.4)	17.0 (13.5–19.25)	
	Psychiatric Nurse	33 (23.7)	18.0 (17.0–23.5)	
Place of work	Arba Minch	26 (18.7)	15.5 (12.0–19.0)	0.028
	Dila	25 (18.0)	18.0 (17.0–25.0)	
	Hawassa	38 (273)	17.0 (13.0–19.0)	
	Hossana	32 (23.0)	18.0 (16.25–20.75)	
	Sodo	18 (13.0)	18.0 (15.75–21.0)	
Health professionals ADHD related Experience				

Variables		Frequency (%)	Total Score Median (IQR)	P value (Nonparametric AOC ^a)
Encountered a child with symptoms of ADHD	No	72 (51.8)	17.0 (14.25-19.0)	0.008
	Yes	67 (48.2)	18.0 (16.0–21.0)	
Referred a child who has symptoms of ADHD to a specialist	No	93 (66.9)	17.0 (15.0–20.0)	0.044
	Yes	46 (33.1)	18.0 (16.0–22.0)	
Involved in the evaluation and diagnosis of ADHD	No	92 (66.2)	17.0 (15.0–19.0)	< 0.001
	Yes	47 (33.8)	20.0 (16.0–23.0)	
Prescribed medication to a child diagnosed with ADHD	No	105 (75.5)	17.0 (15.0–20.0)	0.012
	Yes	34 (24.5)	18.0 (16.75-25.0)	
Counselled a concerned parent about ADHD?	No	88 (63.3)	18.0 (15.0–20.0)	0.289
	Yes	51 (36.7)	18.0 (16.0–21.0)	
Training for ADHD	No	111 (79.9)	18.0 (15.0–20.0)	0.212
	Yes	28 (20.14)	18.0 (16.0-21.75)	
Primary School Teachers				
Primary School Teachers (biodata)	Total	230 (100)	13.0 (10.0-15.25)	
Age	18–25	32 (13.9)	13.0 (11.0-14.75)	0.279
	26–35	100 (43.5)	13.0 (10.0–16.0)	
	36–45	75 (32.6)	12.0 (9.0–15.0)	
	> 45	23 (10.0)	12.0 (8.0–17.0)	

Variables		Frequency (%)	Total Score Median (IQR)	P value (Nonparametric AOC ^a)
Gender	Female	120 (52.2)	13.0 (10.0–15.0)	0.735
	Male	110 (47.8)	12.0 (9.0–16.0)	
Highest Level of Education	Diploma/Certificate	50 (21.7)	13.0 (10.0-15.25)	0.303
	Bachelor’s Degree	163 (70.9)	13.0 (10.0–16.0)	
	Postgraduate	17 (7.4)	11.0 (5.0-15.5)	
School Type	Private	116 (50.4)	13.0 (9.0–16.0)	0.976
	Governmental	114 (49.6)	13.0 (10.0–15.0)	
Grade You Teach	1st-4th Grade	80 (34.8)	13.5 (11.0–16.0)	0.023
	5th-8th Grade	150 (65.2)	12.0 (9.0–15.0)	
Teachers’ ADHD related experience				
Training on ADHD	No	216 (93.9)	13.0 (10.0–15.0)	0.533
	Yes	14 (6.1)	13.5 (9.75–16.5)	
Experience with teaching children with ADHD	No	131 (57.0)	12.0 (9.0–15.0)	0.002
	Yes	99 (43.0)	14.0 (10.0–17.0)	
Referred a child who has symptoms of ADHD	No	139 (60.4)	11.0 (9.0–15.0)	< 0.001
	Yes	91 (39.6)	14.0 (10.0–16.0)	
ADHD Attention-deficit hyperactivity disorder, IQR interquartile range, AOC analysis of comparison a Nonparametric AOC, Mann Whiteny U test was done to compare distribution of scores for variables with two categories and independent-samples Kruskal-Wallis test was used for variables with 3 or				

Variables	Frequency (%)	Total Score Median (IQR)	P value (Nonparametric AOC ^a)
more categories.			

Similarly, teachers with experience in teaching children with ADHD (43%) and those who have referred a child with symptoms of ADHD (39.6%), were found to have a better knowledge score. In addition, teachers who were teaching young children (grade 1–4) ranked higher than those who were teaching 5–8 graders, p value 0.023. Most teachers (93.9%) had never received any training related to ADHD. The proportion of participants who had no specific source of information on ADHD was 36.1%, and 20% simply indicated knowing a child with ADHD as a source. Median scores among subgroups are shown in Table 3.

Rates of Misconception

The KADDS rating scale items provide a gross indication of areas where there is a significant misconception, magnitude of wrong answers, or lack of information, magnitude of “I don’t know” responses. HPs’ average rate of misperception was 41% on the general knowledge scale, 15.3% on the knowledge of symptoms and diagnosis scale, and 36.6% on the knowledge of treatment scale. Likewise, teachers’ average rate of misperception on the respective scales were 36.2%, 15.3%, and 30.2%; whereas the average rates of lack of information among teachers were 36.1%, 22.9%, and 43.5%. (**Supplementary appendix**)

Discussion

As per the knowledge of this author, this is the first research that investigated the knowledge of ADHD among HP in Ethiopia. Furthermore, the present study attempted to measure encounters and experiences of the participants with children with ADHD to highlight gross level of recognition among population groups that are partakers in the identification, management, and care of children with ADHD.

Knowledge and Experience of ADHD in Health Professionals

This study found that HPs’ knowledge scores were distributed around the average of 51.4% on the rating scale. This is closely comparable with studies conducted in Ireland and South Africa, which reported an average score of around 57%. These studies assessed knowledge using tools that contain fewer items and concluded the presence of poor to moderate knowledge (5, 8). On the other hand, an Indonesian study that assessed knowledge primarily of symptoms and treatment reported that 29.7% of GPs scored between 50% and 75% on the measurement tool (20). The difference can be attributed to the measurement tool used, which was less comprehensive. In addition, different health systems and socio-cultural factors could be explanatory.

The HP included in this study were mostly GPs, psychiatric nurses, and medical interns. The results show that psychiatric nurses scored higher on the rating scale compared to GPs and medical interns. Psychiatric nurses also have specific training, more frequent exposure, and experience in managing children with ADHD, all of which explain the higher knowledge among this group. This is supported by the finding that more years of experience and having been involved in the diagnosis and treatment of children with ADHD correlated with increased knowledge, independent of specific profession, in our study. Other studies agree that more experience predicts better knowledge. These studies argue that the coverage of modules on psychiatry, specifically childhood neurodevelopmental disorders, in undergraduate studies is close to nil, which translates to a lack of basic training on the subject. This argument holds in Ethiopian medical schools as well (8, 20).

In the present study, half of the participants had encountered a child with symptoms of ADHD and only one-third had ever evaluated or diagnosed a child with ADHD. This figure is unsatisfactory, given that ADHD is a common childhood mental disorder and Ethiopia is a country that mainly depends on the competence of primary care physicians to recognize the condition. A study in the US reported that only half of children with ADHD are diagnosed during primary care, mostly by paediatricians, and about a quarter may continue without treatment (4). Moreover, in recognition of other studies that claimed GPs' disinterest and self-reported lack of confidence to manage the condition, a transition to primary mental health care has proved to be a challenge that should not be neglected (6, 7).

HP scored higher in the knowledge of symptom subscale (average 73.3%), and a much lower score was observed in the general knowledge and knowledge of treatment subscales. The general knowledge subscale navigates the nature and course of the disorder, and other studies indicate a gap of knowledge in this area as well (15, 33). A discrepancy in the information that resides among HP may create a considerable problem for teachers, parents, and the lay community who seek counselling. For instance, 54.3% of HP incorrectly think that ADHD is not diagnosed in adults and that children will outgrow it (34). This is not an uncommon belief among other studies; however, misperceptions may compromise care when children transition to adolescence and adulthood, a critical time when several risky behaviours emerge (35, 36).

An emphasis needs to be placed on knowledge of how and when ADHD must be diagnosed. Primary care physicians have the power to dismiss concerns or bring them to light if left without any guidelines. In the present study, 40%-60% of health professionals wrongly indicated that in children under the age of four, ADHD symptoms can be distinct from those of a normal child, and were unfamiliar with children's tendency to suppress their symptoms in novel situations, like the clinic. This is valuable information required to accurately diagnose a case of ADHD (4). Approximately half of the participants, who thought that there is a specific sign doctors can examine to diagnose ADHD, are oblivious to the necessity of taking extra measures to interview parents and teachers during the assessment and diagnostic decision process. (37)

One strength of the KADDS scale is that it assesses knowledge of possible comorbidities and alternative diagnoses that, if overlooked, could result in ineffective intervention (15, 24). Accordingly, most of the participants believed that children with ADHD can have inflated self-esteem and that they have a tendency to be destructive and cruel toward others. These areas, if extreme, indicate the presence of alternative behavioural disorders (CD or ODD) (36). Other studies that assessed beliefs and attitudes of HP have demonstrated similar pervasive understandings (5, 35, 38).

Teachers' knowledge and experience of ADHD

Teachers' ADHD knowledge was found to be below average in this study. The score in knowledge of symptoms and diagnosis subscale was the highest, and the treatment subscale was the lowest. This result is closely comparable to a recent study that was conducted in Saudi Arabia and Thailand, (19, 23) and lower than studies conducted in the US, the UK, Ireland, Colombia, and Spain (15, 22, 39, 40). A lower score is expected since most developed countries provide training, special education programs, and have wider research coverage on this topic.

Conversely, the result of this study was incompatible with a previous study conducted in northern Ethiopia in 2021, which reported that 44.8% of participants scored more than half on the total scale and 58.5% scored the same on the treatment subscale (41). In comparison, only 13.5% of the participants in our study scored 50% or more. The study in Saudi Arabia reported that 3.6% scored more than 60% on the scale (19). The study by Dessie *et al.* had a larger sample size and more teachers had indicated a history of teaching a child with ADHD, which, to an extent, could have accounted for the higher score. Nonetheless, the findings are contradictory with other studies, especially considering that knowledge in the treatment subscale is where a major lack of knowledge is often reported, in this study as well as other studies among teachers and other population groups (16, 40, 42).

Extracted from the study by Woyessa *et al.* in the Oromia region, Western Ethiopia, PSTs' knowledge rate was on average 26.7%, with much lower knowledge of treatment and better knowledge of symptoms. This finding was reproduced in this study. In addition, the study evaluated sources of information in relation to knowledge scores. The main source of knowledge for the teachers was multimedia; however, reading books was associated with better knowledge. Since there is no mainstream source of knowledge, training, or teaching manuals accessible to teachers in Ethiopia, as demonstrated also by the present study, knowledge variability within and across different regions is reasonable (42).

Teachers who were teaching children from kindergarten to fourth grade had better knowledge than those teaching children from fifth to eighth grade. This may be indicative of a recent rise in ADHD recognition rate as younger children diagnosed with ADHD enter schools. An improved knowledge of ADHD in repeated studies performed on a similar population evidenced an advancement in knowledge and perception of the topic over time.(18, 40). Other studies that reported a better knowledge in younger teachers are plausible supplements to the evidence of the time parameter (43).

Teachers who had taught a child with ADHD and those who referred a child with symptoms of ADHD to physicians scored higher in this study. Experience in teaching children with ADHD is consistently associated with better knowledge across studies. This remarkable comparability might be attributable to enhanced knowledge-seeking behaviour prompted by the positive pressure of having to teach neuro-atypical children (15, 16, 19, 23, 39, 41). The absence of encounters identified by most teachers in this study is indicative of multitiered failure of recognition: at home, schools, and healthcare, in the city where these teachers were working. Community-based prevalence studies in different regions in Ethiopia among children and adolescents have reported 8%-13% prevalence rate. This equates to the presence of children with ADHD in every classroom whose needs are unmet (12, 44).

The present study identified that only 6.1% of teachers had training about ADHD, and their scores were not significantly higher than those without training. This study, as well as other studies conducted in Ethiopia, have not delved into the type, quality, or intensity of training teachers claimed to have. Even though it is not the aim of our study, this knowledge gap limits our ability to explain why trained teachers did not have better knowledge, besides their small number (26, 27). The impact of training in modifying knowledge and attitude among teachers is evident (16, 22, 39). An observational study has reported that about 51.5% of Sri Lankan teachers who stated to have training on child psychology demonstrated better understanding and attitude of ADHD (45). Similarly, interventional studies that assessed knowledge pre- and post-training have found an improvement in knowledge and teachers' self-reported enhanced perception of the subject (25, 46). Thus, in Ethiopia, training on ADHD, whether ongoing or planned, should be tailored to the findings of knowledge gaps identified in research.

This study is the first to explore knowledge of ADHD among HP, assessing their competence and experience in the process. Moreover, the study attempts to answer these questions by representing three different tiers of professional groups that are integral to the recognition, management, and care of children with ADHD. Note that additional tiers include specialist doctors, psychologists, and parent, thus future studies must expand to include these groups.

Overall, this study shows better comparability with other studies in certain common themes than others. Comparability proved difficult across studies due to the inconsistency in the choices of analyses and choices in result presentation made in various studies. In the present study, analysis was presented mainly in the quantitative format and with multiple approaches to allow cross-comparison with future studies.

Recommendation for Future Research

To comprehensively inform the public health sector about ADHD affected children in Ethiopia, research efforts must stretch further beyond knowledge and experience measurement. Some explorable areas include baseline recognition rate, the presence of guidelines, and interdisciplinary collaboration. ADHD is diagnosed using symptom rating scales that must be completed by parents, children, and teachers (51). Community prevalence studies were conducted using translated versions of these rating scales, which convey a high rate of ADHD.(44) The validity of these symptom rating tools, their application in the

clinical setting, their sensitivity and specificity, and their compliance with current diagnostic criteria must be investigated.

Regardless, the present study creates an opportunity to produce new training interventions appropriate to the variety of cultural values residing in different regions of Ethiopia. Ethiopia is a country with 40% of its population under 15 years of age. Two to five children could be expected to have ADHD in a classroom of 40. And out of the total young population 2.4–4.8M children with ADHD could grow up to contribute to the economy of the country. Therefore, looking away from the consequences of negligence towards ADHD and other neurodevelopmental disorders must be reconsidered (52).

Conclusion

The present study identified an average but insufficient knowledge of ADHD among healthcare providers and low to very low knowledge among teachers. This deficit primarily affects the recognition of the condition and critically impairs the ability to manage children diagnosed with ADHD subsequently. The importance of frequent interaction with these children in enhancing knowledge and perception is evident in this study. The need for an interdisciplinary approach that encompasses teachers, psychologists, and HPs to fully manage and care for children with ADHD requires emphasis. Thus, the apparent next steps are the development of customized knowledge-enhancing tools, readily accessible, and collaboration with stakeholders to plan and implement training for different professional groups.

Abbreviations

AAP American Academy of Paediatrics

ADHD Attention Deficit Hyperactivity Disorder

CD Conduct Disorder

CDC Centers for Disease Control and Prevention

DSM Diagnostic and Statistical Manual of Mental Disorders

GP General Practitioners

HP Health Professionals

IQR Interquartile Range

KADDS Knowledge of Attention Deficit Disorders Scale

ODD Oppositional Defiant Disorder

PST Primary School Teachers

Declarations

Ethical approval

Before data collection, ethical clearance was obtained from the Sidama Public Health Institute's Research Ethical Review Committee. A formal approval letter was obtained from the University of Eastern Finland College's Department of Public Health ethical review committee. The data collectors explained the study's significance and the secure data management and privacy protocol before obtaining informed consent from each participant. All procedures were conducted in accordance with the ethical standards of the institutional research committee and the principles of the Declaration of Helsinki.

Consent for publication:

Not applicable

Availability of data and materials:

The datasets used during the current study are available from the corresponding author on reasonable request

Competing Interests:

The authors have no competing interests to declare that are relevant to the content of this article.

Funding:

The authors did not receive support from any organization for the submitted work.

Authors' Contributions

M.A, T.T, and F.A contributed to the study conception and design. Material preparation and data collection were performed by M.G, R.D, and M.A. The first draft of the manuscript was written by M.A. T.T supervised the study, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Acknowledgements:

The authors are grateful to the key contact persons who mediated data collection in each city, including the administrative bodies of the participant schools, teachers, and health professionals who graciously volunteered to participate in the study.

References

1. CDC. Centers for Disease Control and Prevention [Internet]. 2022 [cited 2023 Apr 15]. Symptoms and Diagnosis of ADHD | CDC. Available from: <https://www.cdc.gov/ncbddd/adhd/diagnosis.html>
2. Kazda L, Bell K, Thomas R, McGeechan K, Sims R, Barratt A. Overdiagnosis of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents: A Systematic Scoping Review. *JAMA Netw Open*. 2021;4(4):e215335. 10.1001/jamanetworkopen.2021.5335 . PubMed PMID: 33843998; PubMed Central PMCID: PMC8042533.
3. Mueller A, Sawicki OA, Günther MP, Glushan A, Witte C, Klaaßen-Mielke R, et al. General practitioner-centred paediatric primary care reduces risk of hospitalisation for mental disorders in children and adolescents with ADHD: findings from a retrospective cohort study. *Eur J Gen Pract*. 2022;28(1):150–6. .2082409 PubMed PMID: 35712903; PubMed Central PMCID: PMC9225782.
4. Wolraich ML, Hagan JF, Allan C, Chan E, Davison D, Earls M, et al. Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents. *Pediatrics*. 2019;144(4):e20192528. 10.1542/peds.2019-2528.
5. Adamis D, Tatlow-Golden M, Gavin B, McNicholas F. General practitioners' (GP) attitudes and knowledge about attention deficit hyperactivity disorder (ADHD) in Ireland. *Ir J Med Sci*. 2019;188(1):231–9. 10.1007/s11845-018-1804-3 . PubMed PMID: 29654530.
6. Tatlow-Golden M, Prihodova L, Gavin B, Cullen W, McNicholas F. What do general practitioners know about ADHD? Attitudes and knowledge among first-contact gatekeepers: systematic narrative review. *BMC Fam Pract*. 2016;17(1):129. 10.1186/s12875-016-0516-x . PubMed PMID: 27605006; PubMed Central PMCID: PMC5013633.
7. Hassink-Franke LJA, Janssen MMM, Oehlen G, van Deurzen PAM, Buitelaar JK, Wensing M, et al. GPs' experiences with enhanced collaboration between psychiatry and general practice for children with ADHD. *Eur J Gen Pract*. 2016;22(3):196–202. 10.1080/13814788.2016.1177506 . PubMed PMID: 27261089.
8. Louw C, Oswald M, Perold M. General Practitioners' Familiarity, Attitudes and Practices with Regard to Attention Deficit Hyperactivity Disorder in Children and Adults. *Off J South Afr Acad Fam Pract Care*. 2009;51. 10.1080/20786204.2009.10873832.
9. Erskine HE, Baxter AJ, Patton G, Moffitt TE, Patel V, Whiteford HA, et al. The global coverage of prevalence data for mental disorders in children and adolescents. *Epidemiol Psychiatr Sci*. 2017;26(4):395–402. 10.1017/S2045796015001158.
10. Bakare MO. Attention deficit hyperactivity symptoms and disorder (ADHD) among African children: a review of epidemiology and co-morbidities. *Afr J Psychiatry*. 2012;15(5):358–61. 10.4314/ajpsy.v15i5.45. Located at: Scopus.
11. Mulu GB, Mohammed AY, Kebede WM, Atinafu BT, Tarekegn FN, Teshome HN, et al. Prevalence and Associated Factors of Attention-Deficit Hyperactivity Disorder among Children Aged 6–17 Years in North Eastern Ethiopia. *Ethiop J Health Sci*. 2022;32(2):321–30. 10.4314/ejhs.v32i2. 13 PubMed PMID: 35693560; PubMed Central PMCID: PMC9175227.

12. Aliye K, Tesfaye E, Soboka M. High rate of attention deficit hyperactivity disorder among children 6 to 17 years old in Southwest Ethiopia findings from a community-based study. *BMC Psychiatry*. 2023;23(1):144. 10.1186/s12888-023-04636-9 . PubMed PMID: 36890504; PubMed Central PMCID: PMC9993367.
13. Tefereedgn EY, Ayana AM, Tefereedgn EY, Ayana AM. Prevalence of Asthma and Its Association with Daily Habits in Jimma Town, Ethiopia. *Open J Asthma*. 2018;2(1):011–7. 10.17352/oja.000009.
14. Golson ME, Brunson McClain M, Ha J, Stigler R, Bera J, Kieffer KEB, et al. A Systematic Review of ADHD Knowledge Measures and Their Psychometric Support. *J Pediatr Psychol*. 2023;48(4):356–74. 10.1093/jpepsy/jsac095 . PubMed PMID: 36806736.
15. Sciutto MJ, Terjesen MD, Frank ASB. Teachers’ knowledge and misperceptions of Attention-Deficit/hyperactivity disorder. *Psychol Sch*. 2000;37(2):115–22. 10.1002/(SICI)1520-6807(200003)37:2%3C115::AID-PITS3%3E3.0.CO;2-5.
16. Poznanski B, Hart KC, Graziano PA. What Do Preschool Teachers Know About Attention-Deficit/Hyperactivity Disorder (ADHD) and Does It Impact Ratings of Child Impairment? *School Ment Health*. 2021;13(1):114–28. 10.1007/s12310-020-09395-6.
17. Barnett B, Corkum P, Elik N. A web-based intervention for elementary school teachers of students with attention-deficit/hyperactivity disorder (ADHD). *Psychol Serv*. 2012;9(2):227–30. 10.1037/a0026001 . PubMed PMID: 22667987.
18. Greenway CW, Rees Edwards A. Knowledge and attitudes towards attention-deficit hyperactivity disorder (ADHD): a comparison of teachers and teaching assistants. *Aust J Learn Difficulties*. 2020;25(1):31–49. 10.1080/19404158.2019.1709875.
19. Alzahrani RH, El-Fatah NKA, ALzahrani RH, El-Fatah NKA. Factors Affecting Knowledge of Attention-Deficit Hyperactivity Disorder Among Female Primary Schoolteachers in Taif City, Saudi Arabia. *Cureus*. 2023;15(6). 10.7759/cureus.40057.
20. Julivia Murtani B, Wibowo JA, Liu CA, Rusady Goey M, Harsono K, Mardani AAP, et al. Knowledge/understanding, perception and attitude towards attention-deficit/hyperactivity disorder (ADHD) among community members and healthcare professionals in Indonesia. *Asian J Psychiatry*. 2020;48:101912. 10.1016/j.ajp.2019.101912 . PubMed PMID: 31923809.
21. Lopez-Lopez A, Lopez-Lafuente A, Eiris-Punal J, Mulas F, Cardo E. Grupo de Trabajo Tdah de la Sociedad Espanola de Neuropediatria G de TT de la SE de N. [A study of primary school teachers’ knowledge of attention deficit hyperactivity disorder]. *Rev Neurol*. 2018;66(S01):S121–6. PubMed PMID: 29516464.
22. Miranda Padilla A, Barrios Cuartas D, Duque Henao LF, Burgos Arroyo EA, Salazar Flórez JE. Knowledge About ADHD in Primary Teachers of Public Schools of Sabaneta, Antioquia. *Rev Colomb Psiquiatr Engl Ed*. 2018;47(3):165–9. 10.1016/j.rcp.2017.04. .002 PubMed PMID: 30017039.
23. Muanprasart P, Traivaree C, Arunyanart W, Teeranate C. Knowledge of attention deficit hyperactivity disorder and its associated factors among teachers in 3 large primary schools in Phra Nakorn Sri

- Ayutthaya Province, Thailand. *J Med Assoc Thai Chotmai* Thangphaet. 2014;97(Suppl 2):S107–114. PubMed PMID: 25518183.
24. Soroa M, Gorostiaga A, Balluerk N. Review of Tools Used for Assessing Teachers' Level of Knowledge with Regards Attention Deficit Hyperactivity Disorder (ADHD). In: Banerjee S, editor. *Attention Deficit Hyperactivity Disorder in Children and Adolescents* [Internet]. InTech; 2013 [cited 2023 May 3]. Available from: <http://www.intechopen.com/books/attention-deficit-hyperactivity-disorder-in-children-and-adolescents/review-of-tools-used-for-assessing-teachers-level-of-knowledge-with-regards-attention-deficit-hypera> 10.5772/54277
 25. Mohammed FA. Teachers Reaction to a Tailored Incredible Years Classroom Management Programme for Children with ADHD Symptoms in Addis Ababa. *Int J Contemp Educ*. 2019;2(1):58. 10.11114/ijce.v2i1.4102.
 26. Woyessa AH, Tharmalingadevar TP, Upashe SP, Diriba DC. Primary school teachers' misconceptions about Attention Deficit/Hyperactivity Disorder in Nekemte town, Oromia region, Western Ethiopia. *BMC Res Notes*. 2019;12(1):524. 10.1186/s13104-019-4573-9.
 27. Dessie M, Techane MA, Tesfaye B, Gebeyehu DA. Elementary school teachers knowledge and attitude towards attention deficit-hyperactivity disorder in Gondar, Ethiopia: a multi-institutional study. *Child Adolesc Psychiatry Ment Health*. 2021;15(1):16. 10.1186/s13034-021-00371-9.
 28. Freeman D. Cultural Variation in Southern Ethiopia: An Introduction. *Northeast Afr Stud* [Internet]. 2000 [cited 2024 Apr 7];7(3):15–20. Available from: <https://www.jstor.org/stable/41931254>
 29. FDRE Ministry of Education. Ethiopia Education System [Internet]. 2024 [cited 2024 Jan 19]. Available from: <https://www.scholaro.com/db/Countries/Ethiopia/Education-System>
 30. LEE CRAWFURD, SUSANNAH HARES. The impact of private schools, school chains and PPPs in developing countries - UNESCO Digital Library [Internet]. 2021 [cited 2024 Jul 23]. Available from: <https://unesdoc.unesco.org/ark:/48223/pf0000380060>
 31. Lifford KJ, Harold GT, Thapar A. Parent-child relationships and ADHD symptoms: a longitudinal analysis. *J Abnorm Child Psychol*. 2008;36(2):285–96. 10.1007/s10802-007-9177-5 . PubMed PMID: 17851751.
 32. Chang LR, Chiu YN, Wu YY, Gau SSF. Father's parenting and father-child relationship among children and adolescents with attention-deficit/hyperactivity disorder. *Compr Psychiatry*. 2013;54(2):128–40. 10.1016/j.comppsy.2012.07.008 . PubMed PMID: 22985803.
 33. Anderson DL, Watt SE, Noble W, Shanley DC. Knowledge of attention deficit hyperactivity disorder (ADHD) and attitudes toward teaching children with ADHD: THE role of teaching experience. *Psychol Sch*. 2012;49(6):511–25. 10.1002/pits.21617.
 34. Atkinson M, Hollis C. NICE guideline: attention deficit hyperactivity disorder. *Arch Dis Child - Educ Pract*. 2010;95(1):24–7. 10.1136/adc.2009.175943.
 35. Ghanizadeh A, Zarei N. Are GPs adequately equipped with the knowledge for educating and counseling of families with ADHD children? *BMC Fam Pract*. 2010;11:5. 10.1186/1471-2296-11-5 PubMed PMID: 20092647; PubMed Central PMCID: PMC2822770.

36. Antshel KM, Barkley R. Attention deficit hyperactivity disorder. In: Handbook of Clinical Neurology [Internet]. Elsevier; 2020 [cited 2023 Apr 9]. pp. 37–45. Available from: <https://linkinghub.elsevier.com/retrieve/pii/B978044464148900003X> 10.1016/B978-0-444-64148-9.00003-X
37. Austerman J. ADHD and behavioral disorders: Assessment, management, and an update from DSM-5. *Cleve Clin J Med*. 2015;82(11 Suppl 1):S2–7. 10.3949/ccjm.82.s1.01 . PubMed PMID: 26555810.
38. Shaw KA, Mitchell GK, Wagner IJ, Eastwood HL. Attitudes and practices of general practitioners in the diagnosis and management of attention-deficit/hyperactivity disorder. *J Paediatr Child Health*. 2002;38(5):481–6. 10.1046/j.1440-1754.2002.00033.x PubMed PMID: 12354265.
39. Lopez-Lopez A, Lopez-Lafuente A, Eiris-Punal J, Mulas F, Cardo E. Grupo de Trabajo Tdah de la Sociedad Espanola de Neuropediatria G de TT de la SE de N. [A study of primary school teachers' knowledge of attention deficit hyperactivity disorder]. *Rev Neurol*. 2018;66(S01):S121–6. PubMed PMID: 29516464.
40. Ward VA. What knowledge and conceptions do Irish primary schoolteachers hold on attention deficit hyperactivity disorder? *Ir Educ Stud*. 2014;33(4):489–512. 10.1080/03323315.2014.977643.
41. Dessie M, Techane MA, Tesfaye B, Gebeyehu DA. Elementary school teachers knowledge and attitude towards attention deficit-hyperactivity disorder in Gondar, Ethiopia: a multi-institutional study. *Child Adolesc Psychiatry Ment Health*. 2021;15(1). Located at: Scopus. 10.1186/s13034-021-00371-9
42. Woyessa AH, Tharmalingadevar TP, Upashe SP, Diriba DC. Primary school teachers' misconceptions about Attention Deficit/Hyperactivity Disorder in Nekemte town, Oromia region, Western Ethiopia. *BMC Res Notes*. 2019;12(1). Located at: Scopus. 10.1186/s13104-019-4573-9
43. Muanprasart P, Traivaree C, Arunyanart W, Teeranate C. Knowledge of attention deficit hyperactivity disorder and its associated factors among teachers in 3 large primary schools in Phra Nakorn Sri Ayutthaya Province, Thailand. *J Med Assoc Thai Chotmaiht Thangphaet*. 2014;97(Suppl 2):S107–114. PubMed PMID: 25518183.
44. Mulu GB, Mohammed AY, Kebede WM, Atinafu BT, Tarekegn FN, Teshome HN, et al. Prevalence and Associated Factors of Attention-Deficit Hyperactivity Disorder among Children Aged 6–17 Years in North Eastern Ethiopia. *Ethiop J Health Sci*. 2022;32(2):321–30. 10.4314/ejhs.v32i2.13. Located at: Scopus.
45. Rodrigo M, Perera D, Eranga V, Williams S, Kuruppuarachchi K. The knowledge and attitude of primary school teachers in Sri Lanka towards childhood attention deficit hyperactivity disorder. *Ceylon Med J*. 2011;56(2):51. 10.4038/cmj.v56i2.3108.
46. Awadalla NJ, Ali OF, Elshaer S, Eissa M. Role of school teachers in identifying attention deficit hyperactivity disorder among primary school children in Mansoura, Egypt. *East Mediterr Health J Rev Sante Mediterr Orient Al-Majallah Al-Sihhiyah Li-Sharq Al-Mutawassit*. 2016;22(8):586–95. 10.26719/2016.22.8.586 PubMed PMID: 27834440.

47. Moldavsky M, Sayal K. Knowledge and attitudes about attention-deficit/hyperactivity disorder (ADHD) and its treatment: the views of children, adolescents, parents, teachers and healthcare professionals. *Curr Psychiatry Rep.* 2013;15(8):377. 10.1007/s11920-013-0377-0 . PubMed PMID: 23881709.

48. Evans SW, Owens JS, Wymbs BT, Ray AR. Evidence-Based Psychosocial Treatments for Children and Adolescents With Attention Deficit/Hyperactivity Disorder. *J Clin Child Adolesc Psychol Off J Soc Clin Child Adolesc Psychol Am Psychol Assoc Div 53.* 2018;47(2):157–98. 10.1080/15374416.2017.1390757 PubMed PMID: 29257898.

49. Kevin R, Krull. Attention deficit hyperactivity disorder in children and adolescents: Overview of treatment and prognosis. UpToDate® [Internet]. 2022 Jun. Available from: <https://www.wolterskluwer.com/en/solutions/uptodate>

50. Arnold LE, Hodgkins P, Kahle J, Madhoo M, Kewley G. Long-Term Outcomes of ADHD: Academic Achievement and Performance. *J Atten Disord.* 2020;24(1):73–85. 10.1177/1087054714566076.

51. Chang LY, Wang MY, Tsai PS. Diagnostic Accuracy of Rating Scales for Attention-Deficit/Hyperactivity Disorder: A Meta-analysis. *Pediatrics.* 2016;137(3):e20152749. 10.1542/peds.2015-2749 . PubMed PMID: 26928969.

52. CIA. Ethiopia Country Profile. In: The World Factbook [Internet], Central A. 2023 [cited 2023 May 27]. Available from: <https://www.cia.gov/the-world-factbook/countries/ethiopia/#people-and-society>

Figures

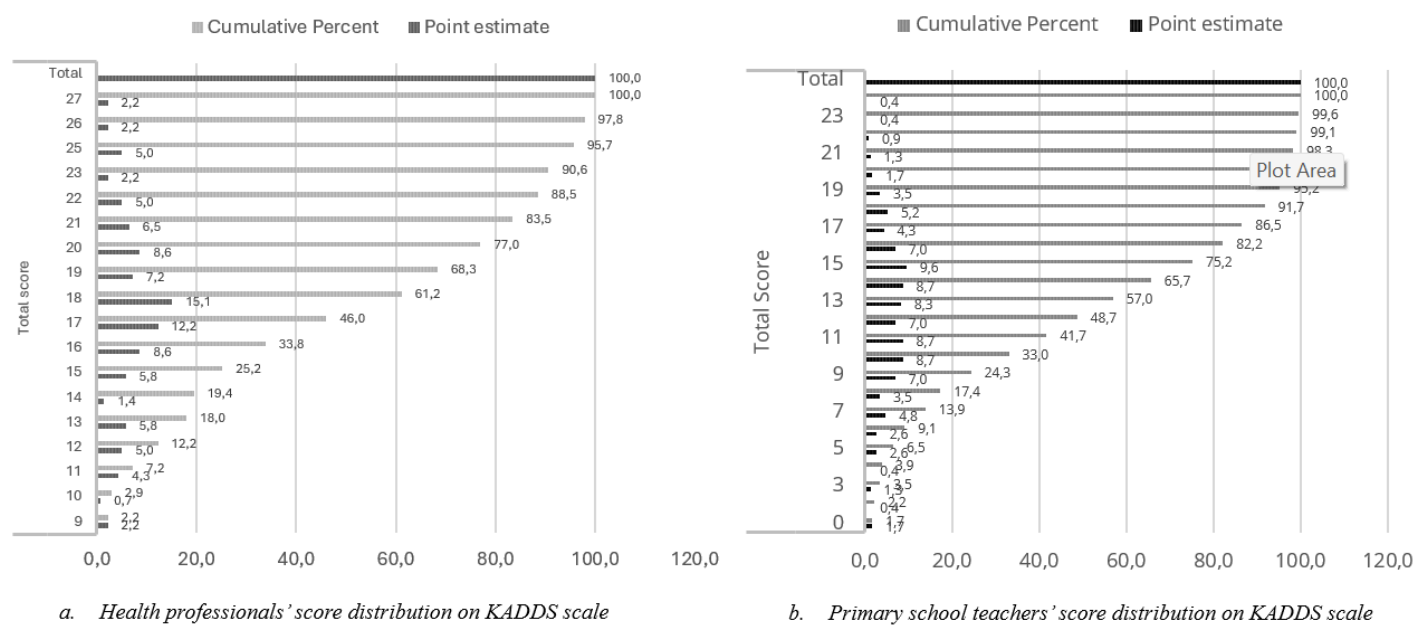


Figure 1

Distribution of health professionals' and teachers total score where maximum possible score is 35 and 25%, 50%, and 75% cut-off points are 9, 18, and 27