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# NIGERIAN AUTISM SCREENING QUESTIONNAIRE (NASQ)

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# Development and Clinical Validation of Nigerian Autism Screening Questionnaire (A Two-Phase Study)

Supported by Autism Speaks and Ike Foundation for Autism in Nigeria

**First Phase:**
The first phase was the development and community validation of Nigeria Autism Screening Questionnaire (NASQ) which was started in 2016 and completed in 2022.

**Second Phase:**
The second phase is the Clinical Validation of Nigerian Autism Screening Questionnaire (NASQ) being planned for future. This will involve the administration of Nigerian Autism Screening Questionnaire in Clinical Settings in Nigeria and comparing it to Goal Standards such as ADI-R and ADOS.

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# First Phase

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*Short Report*

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## Brief report: Validity and reliability of the Nigerian Autism Screening Questionnaire

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**Abstract**

Informant-report measures for screening symptoms of autism spectrum disorder (ASD) and other neurodevelopmental disorders (NDDs) are needed for low-resource settings if early identification is to be prioritized because early developmental concerns are likely to be expressed by parents and other caregivers. This paper describes the initial psychometric evaluation of the Nigeria Autism Screening Questionnaire (NASQ). Parents and other caregivers completed the NASQ on 12,311 children ages 1 to 18 in a Nigerian population sample as part of the World Bank National General Household Survey conducted in the country in 2016. Factor analyses indicated a parsimonious three-factor structure with social communication/interaction, repetitive sensory motor, and insistence on sameness dimensions. Measurement invariance was excellent across age and sex. Reliability of the subscales and total scale was good, and item response theory analyses indicated good measurement precision in the range from below average to high scores, crucial for screening, and tracking ASD symptoms. Studies with gold standard ASD diagnostic instruments and clinical confirmation are needed to evaluate screening and diagnostic accuracy. The NASQ appears to be a reliable instrument with a clear factor structure and potential for use in screening and tracking ASD symptoms in future Nigerian samples.

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# INTRODUCTION

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- The need for a free informant-report screening tool that can be used in low resource setting like Nigeria informs development of the screening Questionnaire.

- Previous existing Screening Instruments were reviewed in the process of development of NASQ.

- Rather than choosing an existing available screening tool, the NASQ was developed based on a desire to cover DSM-5 criteria (American Psychiatric Association, 2013).

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# METHODS

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- Following development, the NASQ was implemented in the household questionnaire in the post-harvest phase of the Wave 3 General Household Survey (GHS-panel) data collection.
- The sample of 5000 households was determined to be nationally representative for the World Bank's survey aimed to determine social and economic conditions of people in Nigeria.
- Participants included informants, typically biological parents, of children ages 1–18 included in the General Household Survey (GHS) fielded by the National Bureau of Statistics (NBS) in 2015–2016.
- The field workers collecting data for the GHS Wave 3 data were trained at the NBS office in Abuja, Nigeria, with the aid of audio–visual medium on each item of the questionnaires.

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# MEASURES

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- The final selection of items was carried out to ensure coverage of the DSM-5 criteria and associated symptoms.
- The final NASQ questionnaire (Supplement 1) included 26 questions eliciting dichotomous (yes/no) responses.
- The first two questions assess the presence of expected levels of speech. The remaining 24 questions assess core autism symptoms.
- Four questions that assess developmental concerns were also collected as part of the larger national survey. The 4 Questions are:

**(1) Are you worried about [Name's] language and communication development?**

**(2) Are you worried about [Name's] relationship with peers?**

**(3) Are you worried about [Name's] development and use of hands and limbs?**

**(4) Are you worried about [Name's] odd or repetitive behavior?**

A positive response to any of the four questions was coded as a developmental concern (any developmental concern).

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# RESULTS

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- The final sample included 12,311 participants (ages 1–18)
- Most participants were biological children of the informant (86.7%), sex was shifted slightly toward males (53.4%), and a substantial minority had a developmental concern (15.9%) (Table 1).
- Geographic distributions were consistent with greater population in northern zones, with most (76.1%) living in northern zones and nearly threequarters (73.2%) living in rural regions.
- NASQ total raw scores had a positively skewed distribution with the overall modal, median, and mean scores being 2, 4, and 4.9 respectively.
- No Developmental Concern—Median = 3.0, M = 4.5, SD = 4.0;
- Developmental Concern—Median = 6.0, M = 7.4, SD = 4.6 (Figure 1).

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# FIGURE 1

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**Table 1.** Demographic characteristics in the total sample and developmental concern sub-samples.

| | Total | Ages 1–3:11 | Ages 4–6:11 | No concern | Developmental concern | $\chi^2/t$ (p) | Cohen's *d* |
|---|---|---|---|---|---|---|---|
| | M (*SD*) | M (*SD*) | M (*SD*) | M (*SD*) | M (*SD*) | | |
| *N* | 12,311 | 1272 | 2160 | 10,357 | 1954 | | |
| Age (range) | 9.8 (4.6, 1–18) | 2.5 (0.5) | 5.1 (0.8) | 9.8 (4.6, 1–18) | 9.7 (4.6, 1–18) | 1.1 (.270) | .03 |
| Sex (n, % male) | 6569 (53.4%) | 1272 (53.7%) | 1101 (51.0%) | 5524 (53.3%) | 1045 (53.5%) | 0.1 (.907) | .01 |
| Any developmental concern | 1954 (15.9%) | 232 (18.2%) | 334 (15.5%) | – | – | | |
| Worry about language/communication | 1441 (11.7%) | 169 (13.3%) | 238 (11.0%) | – | – | | |
| Worry about relationship with peers | 1441 (11.7%) | 158 (12.4%) | 241 (11.2%) | – | – | | |
| Worry about motor development | 1183 (9.6%) | 132 (10.4%) | 194 (9.0%) | – | – | | |
| Worry about odd or repetitive behavior | 1026 (8.3%) | 118 (9.3%) | 168 (7.8%) | – | – | | |
| Country zone | | | | | | 903.4 (<.001) | .56 |
| Zone 1: North Central | 2227 (18.1%) | 193 (15.2%) | 391 (18.1%) | 1880 (18.2%) | 347 (17.8%) | | |
| Zone 2: North East | 2507 (20.4%) | 267 (21.0%) | 435 (20.1%) | 1667 (16.1%) | 840 (43.0%) | | |
| Zone 3: North West | 3394 (27.6%) | 426 (33.5%) | 652 (30.2%) | 3111 (30.0%) | 283 (14.5%) | | |
| Zone 4: South East | 1321 (10.7%) | 118 (9.3%) | 219 (10.1%) | 1272 (12.3%) | 49 (2.5%) | | |
| Zone 5: South Central | 1584 (12.9%) | 141 (11.1%) | 267 (12.4%) | 1292 (12.5%) | 292 (14.9%) | | |
| Zone 6: South West | 1278 (10.4%) | 127 (10.0%) | 196 (9.1%) | 1135 (11.0%) | 143 (7.3%) | | |
| Rural sector | 9008 (73.2%) | 961 (75.6%) | 1580 (73.1%) | 7560 (73.0%) | 1448 (74.1%) | 1.0 (.310) | .02 |
| Relationship to informant | | | | | | 14.6 (.012) | .07 |
| Biological child | 10,786 (87.6%) | 1142 (89.8%) | 1926 (89.1%) | 9108 (87.9%) | 1678 (85.9%) | | |
| Step child | 108 (0.9%) | 9 (0.7%) | 15 (0.7%) | 82 (0.8%) | 26 (1.3%) | | |
| Grandchild | 791 (6.4%) | 102 (8.0%) | 166 (7.7%) | 658 (6.4%) | 133 (6.8%) | | |
| Sibling | 166 (1.3%) | 5 (0.4%) | 17 (0.8%) | 127 (1.2%) | 39 (2.0%) | | |
| Niece/nephew | 196 (1.6%) | 8 (0.6%) | 18 (0.8%) | 161 (1.6%) | 35 (1.8%) | | |
| Other | 264 (2.2%) | 6 (0.5%) | 15 (0.7%) | 221 (2.1%) | 43 (2.2%) | | |
| NASQ total score (M, *SD*, range) | 4.9 (4.2, 0–20) | 5.2 (4.3, 0–19) | 5.0 (4.2, 0–20) | 4.4 (4.0) | 7.3 (4.6) | −28.4 (<.001) | −.70 |

Note. *SD*: standard deviation; ASD = autism spectrum disorder. NASQ = Nigerian Autism Screening Questionnaire scored 0 = no problem, 1 = problem for 24 items evaluating ASD characteristics. For non-verbal children, items requiring the presence of speech were rated as 0.

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# OTHER STATISTICAL ANALYSIS

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Other Statistical analysis done on NASQ in the process of community validation included:

- Factor Structure
- Measurement Invariance and
- Reliability

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# DISCUSSION

- This study describes the initial psychometric evaluation of a newly developed, culturally sensitive autism symptom measure, the NASQ, as part of a nationally representative household survey in Nigeria.

- The present investigation takes an important first step by identifying that the NASQ is a reliable tool with good structural validity and might be useful as a screening and symptom tracking instrument in this resource-limited environment.

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# CONCLUSION

Inspection of the NASQ score distribution in the present sample indicates that a total raw score greater than 7 is likely to be the most useful to explore as cut off scores to inform screening and diagnostic judgments.

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# Reference:

Bakare MO, Frazier TW, Karpur A, Abubakar A, Nyongesa MK, Mwangi PM, Dixon P, Khaliq I, Gase NK, Sandstrom J, Okidegbe N, Rosanoff M, Munir KM, Shih A. Brief report: Validity and reliability of the Nigerian Autism Screening Questionnaire. Autism. 2022 Mar 9:13623613221080250. doi: 10.1177/13623613221080250. Epub ahead of print. PMID: 35261274.

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