# CROSS-CULTURAL ADAPTATION AND VALIDATION OF THE IGBO VERSION OF THE RETURN TO WORK ASSESSMENT SCALE (I-RAS) AMONG STROKE SURVIVORS IN SOUTH-EAST NIGERIA

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## ABSTRACT

**BACKGROUND**: The Return-to-work Assessment Acale (RAS) questionnaire is an outcome instrument used to measure the physical, psychological and social behavior and response of individuals to returning to work following injury or illness. This instrument has been validated in the English language, though here in Nigeria we have three (3) major languages: Igbo, Hausa and Yoruba.

**AIM:** The aim of this study was to translate, culturally adapt and validate the Igbo version of RAS in order to enhance its use in Igbo speaking population.

**METHOD:** This study was a cross-sectional survey involving 100 post stroke survivors. The original version of Return-to-work Assessment Scale (ERAS) was translated to Igbo (IRAS) and cross-validated. This Igbo version of RAS (IRAS) was subjected to reliability, validity and internal consistency.

**RESULT:** the results revealed that 59 (59.0%) were males and 41 (41.0%) females. Internal consistency was high with a Cronbach's alpha coefficient of 0.86 for Domain 1, 0.86 for Domain 2 and 0.87 for Domain 3. Test-retest reliability analysis gave an ICC of 0.99(p=0.001) for Domain 1, Domain 2 an ICC of 0.99(0.001), Domain 3 an ICC of 0.99(0.001). TheKaiser-Meyer-Olkin measure of sampling adequacy(KMO) value for Domain 1 was $X^2$=0.69 and that of Bartlett's test of sphericity value was significant (p=0.001); Kaiser-Meyer-Olkin measure of

sampling adequacy for Domain 2 was $X^2$=0.80 and the Bartlett's test of sphericity value was significant (P=0.001); the Kaiser-Meyer-Olkin measure of sampling adequacy for Domain 3 was $X^2$=0.79 while the Bartlett's test of sphericity was significant (p=0.001).

**CONCLUSION:** The Igbo version of the Return-to-work Assessment Scale (IRAS) is a good, reliable and internally consistent toolfor assessing readiness to return to work in Igbo stroke survivors.

**Keywords:** *Stroke, Work, Return-to-work, Return-to-work Assessment Scale, Translation and Cross-cultural adaptation*

## Introduction

The International Classification of Functioning, Disability and Health (ICF) defined work as engaging in all aspects of work, as an occupation, trade, profession or other form of employment, for payment or when payment is not provided, as an employee, full time or part-time, or self-employed[1,2]. According to Eriksson *et al.*, work includes all aspects of work and employments or being self-employed, for payment or unpaid. Work plays an essential role in peoples' lives, may be therapeutic, and has positive health effects for people with or without disabilities[3]. Asides its economic significance as an important source of income, work is associated with benefits of critical importance for an individual's health and well-being. It is necessary for active involvement in society and for satisfying essential psychosocial needs; it helps develop and maintain one's identity and social status[4, 5]. Not participating in working-life has both social and personal economic consequences, as well as a negative impact on quality of life[3]. Individuals who aren't able to work in any construct of work are said to be "work disabled" - and a class of individuals who are often work disabled are stroke patients.

Stroke which is a cardiovascular accident is a major cause of long-term disability and the second leading cause of death globally, with an associated high economic cost and detrimental impact on the physical, social and psychological functioning of the survivors[6]. According to the Global Burden of Disease Study, stroke affects 13.7million people globally per year and is the second leading cause of death, with 5.5million deaths per year[7]. An estimated 1 in 4 adults will experience a stroke in their lifetime and there are >80million survivors of stroke globally[8, 9]. Its mortality in Nigeria is high. According to Danesi *et al.*, in a study conducted in Lagos, Southwest Nigeria, the gender specific rate was 28.3/100,000 for males and 21.3/100,000 for females[10]. The age adjusted rate was 54.08% per 100,000 year; hospitalization rate was 84.6%, while the case-fatality-rate (CFR -hospitalized) was 16.2% in Surulere Sub-urban of Lagos [2,

[10]. In a study conducted in Ondo, Southwest Nigeria, Okon *et al.,* placed pathologic diagnosis as confined in 75% of the cases[11]. Stroke is the leading cause of neurological admissions into tertiary health care institutions in Nigeria also accounting for a fatality rate between 1.8% and 15.6% of all deaths in these institutions and as such is an important health concern for individuals and society and a public health burden in Nigeria [2, 12].

Individuals who have suffered a stroke accident and survived are referred to as Post stroke survivors. The incidence of stroke is growing in different parts of the world and the condition most commonly affects the working-age population, say, one in four patients is less than 60 years old [13,14]. Hence the social, physical and psychological consequences of stroke affect the rate of return to work of working-age post stroke adults.

Return-to-work, often abbreviated as RTW, can mean the process of returning to work but also refers to an outcome of the process of vocational rehabilitation[3]. Return-to-work is not just astate, but a multi-phase process, encompassing both a series of events, transitions and phases as well as interaction with other individuals and the environment. The process begins at the onset of the work disability and concludes when a satisfactory long-term outcome has been achieved. This RTW-process is complex, requires constructive collaboration between stakeholder and an openness for new solutions and approximately 40% -50% of those having stroke in working ages do not return to work[3]. The RTW-process is dependent on the dynamic interaction between a person's health status and contextual factors hence, it is important to have instruments which can capture the dynamic nature of the RTW process [15,16]. Therefore the return-to-work assessment scale is used to assess their level, capability and readiness toreturn to work.

The Return-To-Work assessment scale (RAS) is an outcome measure developed by Ibikunle *et al.,* which assesses return to work among post stroke survivors[2]. This instrument was designed to assist stroke survivors with assessing their readiness to return to work. It is a self-report questionnaire with 2 sections (A and B) and containing a sum total of 86 items in the 3 domains of the section B. Each domain of the RAS questionnaire has sub domains which answers questions addressing the personal, work and contextual factors aspect of the individual's life and well-being. The domains address separate aspects of the individual's life and contains unequal number of sub domains therefore they are scored separately. The RAS outcome measure has been shown to be reliable and valid in a patient population of various age and gender post stroke survivors[2]. Hence the RAS is an excellent, intentionally consistent and reliable tool that demonstrates good group reliability, internal consistency and structural validity and should be adapted for use in monitoring return to work in post stroke patients[2].

Cross-cultural adaptation of validated outcome instruments has been advocated to facilitate their use in international multi-center clinical trials [17, 18], which would also

reduce the need for developing new instruments with the same purpose[18, 19]. To maintain the validity of the original instrument while taking into consideration important cultural differences, a specific methodology has been developed for the adaptation process [18,20,21,22]. Nigeria is a multicultural country, with the South Eastern region (Igbo speaking population and one of the main indigenous language), constituting of approximately 22million of the total 193million Nigerian population[23]. There is need for translation, cross cultural adaptation and validation of RAS as a standardized outcome measure for Igbo monolingual individuals who have survived stroke in Nigeria.

The Return-to-work assessment scale is a good, internally consistent and reliable tool that has demonstrated good group and structural validity in English language[2]. In Nigeria, the RAS hasn't been cross culturally translated or adapted to any tribe, language or geographical region. Hence, the Nigerian Native languages (Igbo, Hausa, Yoruba and other tribal languages) monolinguals in Nigeria lack a standardized uniform outcome measure for post stroke individuals seeking physiotherapy and medical evaluation and assessment to return to work.

The absence of the Igbo version of RAS (I-RAS) in the hospitals will short-change the post stroke Igbo monolinguals in Nigeria to access complete and effective medical care. Therefore, there is a need for the original English version of the RAS questionnaire to be translated, cross-culturally adapted and validated as the Igbo version of RAS (I-RAS).

The aims of this study are to:

1. Translate Original English version of RAS (E-RAS) to I-RAS.
2. Cross-culturally adapt and validate the I-RAS to the Igbo culture and environment.

The outcome of this study has established a standardized outcome measure which will be used in hospitals for Igbo monolinguals in Nigeria.It has also provided a uniform communication measure for assessing post stroke individuals who are Igbo monolinguals.

This study will promote the evaluation of medical treatment, physiotherapy interventions among Igbo monolinguals who are post stroke survivors.This study will stand as a reference and aid further research purposes.

## Materials and method

This research wasa cross-sectional survey.The population for this study were adult individuals aged 40 years and above who were post stroke survivors within selected locations in South East Nigeria, who met the inclusion criteria. They were recruited from the following health institutions;

1. Nnamdi Azikiwe University Teaching Hospital. Nnewi, Anambra State.

2. Federal Medical Centre Owerri, Imo state.
3. Enugu-ukwu
4. Igbo-ukwu

**Inclusion Criteria**

1. Participants who are post stroke survivors in the selected South-Eastern health establishments.

2. Patients who are 40 years and above.

3. Patients who are literate in both English and Igbo language.

4. Patients who are emotionally stable.

**Exclusion criteria**

1. Patients whose symptoms duration was less than two months.
2. Patient's inability to complete questionnaires because of cognitive impairments or language barriers.
3. Post stroke survivors who are not willing to participate
4. Patients with other comorbidities that can affect their return to work.

**Sampling techniques and sample size**

Purposive sampling technique was used to select post stroke survivors from the selected institutions.

One hundred (100) participants were recruited from the selected health establishments in the South-Eastern region of Nigeria.

**Research Instrument**

**The RAS Questionnaire**

The return-to-work assessment scale (RAS) questionnaire according to Ibikunle*et al.*, (2021), is an instrument designed to assist stroke survivors with assessing their readiness return to work. The scale is made up of two sections, A and B.

Section A is made up of general questions about the individual completing the scale, while section B includes three parts that are important to consider in deciding the individual's ability to return to work. The three domains of return to work in section B are scored separately; each domain assesses a different concept in return to work. Domain 1 (personal), Domain 2 (work), Domain 3 (contextual factors). It is important to note that the three (3) Domains are assessed independently of the other, so their scores do not provide an overall sum.

**Psychometric properties of the RAS**

**Internal consistency**

Internal consistency was high with a Cronbach's alpha coefficient of 0.81 for Domain 1, 0.93 for Domain 2 and 0.76 for Domain 3.

**Reliability**

Test-retest reliability analysis gave an ICC of 0.85(p=0.001) for Domain 1, Domain 2 an ICC of 0.91 (p=0.001) and Domain3 an ICC of 0.99(p=0.001).

**Validity**

TheKaiser-Meyer-Olkin measure of sampling adequacy (KMO) value for Domain 1 was X2 =0.63 and that of Bartlett's test of sphericity value was significant (P=0.000), Kaiser-Meyer-Olkin measure of sampling adequacy for Domain 2 was 0.84 and the Bartlett's test of sphericity value was significant (P=0.000), the Kaiser-Meyer-Olkin measure of sampling adequacy for Domain 3 was 0.66 while the Barlett's test of sphericity was significant (p=0.001). Therefore, the factor analysis was appropriate.

**Scoring of RAS**

The scoring of RAS follows established methods in the RAS questionnaire developed by Ibikunle *et al.,*[2]. It consists of two sections: A and B; section A involves general questions about the individuals while the section B addresses 3 domains which is important to consider in the decision to return to work. The 3 domains of the RAS questionnaire address different constructs and are therefore scored separately. The RAS questionnaire is thus scored as:

**Domain 1**

0-53 Poor not ready to return
54-106 moderately ready to return
107-140 Independent and ready to return

**Domain 2**

0-22 Poorly able to cope
23-46 moderately able to cope
47-93 Able to cope at work place

**Domain 3**

0-19 Poorly supportive
20-38 mildly supportive
39-57 moderately supportive
58-95 Contextual factors supportive

**Procedure for Data Collection**

An ethical approval was obtained from the Ethical Review Committee of Nnamdi Azikiwe University Teaching Hospital Nnewi before the commencement of this study. A letter of introductionwas also gotten from the Department of Medical Rehabilitation Nnamdi Azikiwe introducing the researcher as one of her students thereby facilitated the permission to conduct the study in the Physiotherapy Department of the selected healthinstitutions where data was collected.

The procedure employed in this study followed the guideline for translation and cross-cultural adaptation by Beaton et al [24]. The procedure for this study was in 3 phases:
Phase 1: Translation Phase.
Phase 2: Adaptation Phase.
Phase 3: Validation Phase.

The purpose and procedure of this study was explained to the participants who met the inclusion criteria. They were made to understand that their participation in this study would be voluntary. Therefore, only post stoke survivors who gave their informed consent were allowed to partake in this study. The socio-demographic characteristics (age, sex, occupation) and

information on the part(s) of the body that was affected were obtained from the participants. They responded to the questionnaire according to their abilities to do so and they answered/completed all sections.

**PHASE 1: TRANSLATION PHASE**

This involves the translation of the original English version of the RAS to Igbo version of RAS. The original English version of RAS was translated by two bilingual translators whose first language is Igbo, with one having a medical background and the other having no medical background (forward translation). This produced two different Igbo versions of RAS (T1 and T2). The two forward translations were reviewed and discussed by the two translators and a synthesized version was formed (T-12), differences were resolved by consensus. The synthesized version (T-12) was translated back to English language (back translation – B1 and B2) by two other bilingual translators (who speaks and understands both English and Igbo languages), who are graduates of English language and had no idea of the concepts being investigated.

**PHASE 2: ADAPTATION PHASE**

The translations (T1, T2, T-12, B1, and B2) were reviewed by members of an expert committee comprising of translators (forward and back translators), physiotherapist, and an outcome methodologist. Discrepancies were resolved by consensus to achieve semantic equivalence, idiomatic equivalence, experiential equivalence and conceptual equivalence of the pre-final Igbo version of RAS. The pre-final version was created and subjected to field testing on twenty (20) post stroke patients of both genders. The findings of this field testing were reviewed by this expert committee in a second meeting to produce the final Igbo version of RAS (I-RAS).

**PHASE 3: VALIDATION PHASE**

The final Igbo version of RAS and the original English version of RAS were distributed to post stroke survivors among patients attending physiotherapy sessions in selected health institutions in the South-East of Nigeria. The order of administration of the two questionnaires was based on importance; the final Igbo version of the RAS was administered first.The I-RAS questionnaire was re-administeredon the participants a week after the first administration by the researcher.

**Procedure for Data Analysis**

1. The data and scores on the I-RAS and E-RAS obtained from this study were summarized using frequency counts and percentages, mean and standard deviation.
2. The Spearman rank order correlation coefficient was used to analyze the correlation between participants' scores on the E-RAS and I-RAS (to determine known group validity), and was also used to analyze the correlation between the items in the E-RAS and I-RAS, (to determine construct validity).

3. The Interclass Correlation Coefficient (ICC) and Bland and Altman plotting method was used to compare the scores on the I-RAS at the two different occasions to determine the test-retest reliability of I-RAS.
4. The Cronbach's alpha was used to determine the internal consistency of the I-RAS.
5. Factor analysis was used to determine the structural validity of the I-RAS.

The level of significance was set at ≤ 0.05.

## RESULTS

### Phase 1: Translation process of the original version of the Return to work Assessment scale (RAS) to the Igbo version of the RAS.

The original version of the RAS was translated to Igbo version which produced two different Igbo versions of I-RAS (T1 and T2). The two forward translations (T1 and T2) were reviewed, discussed and a synthesis (T-12) was reached. The consensus version (T-12) was translated back to English Language (B1 and B2).

### Phase 2: Cross-cultural Adaptation process of the RAS into Igbo culture and environment.

All the instructions, domain preambles of each section were retained. Out of the total 86 items in the section B of the ERAS questionnaire, one (1) item was removed, one (1) totally modified and terms in some items modified during the process of cultural adaptation. Table 5 summarizes the modifications. Some terms (e.g. the options *Right* and *Left* in items 4, 5 and 7 of section A) were replaced with Igbo culturally equivalent terms. Some other terms (e.g. responses *Unable to* and its likes occurring in section B) were modified to their personalized forms to match with the culturally adapted Igbo lexis and structure. Item 5 of the Personal domain and the term *Cordial* in the work domain of section B were replaced with the semantic equivalent in the culturally adapted Igbo RAS.

### Phase 3: Validation of Igbo RAS

### Socio-Demographic distributionof the participants

One hundred patients who are stroke survivors participated in the psychometric testing of the Igbo RAS (Table 1). They comprised of 59 (59.0%) males and 41 (41.0%) females with age groups ranging from 40 (being the minimum age in the inclusive criteria) to 80 years (the maximum age encountered during data collection). The most frequently affected age group was 51 to 60 years (Table 1). All the participants (i.e. 100%) are Africans in the option of Race.The participants were categorizedaccording to the nature of their employment frequency, in which 62 (62.0%) participants were under permanent employment (Table 3). In the aspect of employment function/position, *others;* an option referring toparticipants who carry out non-administrative and non-technical functions was ticked the most: (66.0%)

(Table 3). In the clinical aspect, 47 (47.0%) participants presented with left sided paralysis (Table 2); 44 (44.0%) participants presented with Hypertension as the most frequent comorbidity (Table2).

**TABLE 1: Frequency Table**

| Variable | Class | Frequency | Percent (%) |
|---|---|---|---|
| Sex | Male | 59 | 59.0 |
| | Female | 41 | 41.0 |
| | Total | 100 | 100.0 |
| Race | African | 100 | 100.0 |
| Age | 31-40 | 8 | 8.0 |
| | 41-50 | 24 | 24.0 |
| | 51-60 | 38 | 38.0 |
| | 61-70 | 24 | 24.0 |
| | 71-80 | 6 | 6.0 |

**Table 2: Clinical variables of participants in the validity study**

| Variable | Class | Frequency | Percent(%) |
|---|---|---|---|
| Side affected | Right side | 46 | 46.0 |
| | Left side | 47 | 47.0 |
| | Both sides | 7 | 7.0 |
| Location of brain | Right | 49 | 49.0 |
| | Left | 46 | 46.0 |
| | Both | 5 | 5.0 |
| Grading of stroke | Total weakness | 10 | 10.0 |
| | Partial weakness | 90 | 90.0 |
| Impairment | Right | 48 | 48.0 |
| | Left | 49 | 49.0 |
| | Both | 3 | 3.0 |
| Speech defect | Yes | 28 | 28.0 |
| | No | 72 | 72.0 |
| Cognitive defect | Yes | 53 | 53.0 |
| | No | 47 | 47.0 |
| Hospitalization | No | 53 | 53.0 |
| | Days | 4 | 4.0 |
| | Weeks | 25 | 25.0 |
| | Months | 11 | 11.0 |
| | Years | 7 | 7.0 |
| Treatment | None | 23 | 23.0 |
| | Hospital drugs | 54 | 54.0 |
| | Igbo drugs | 4 | 4.0 |
| | Traditional | 7 | 7.0 |
| | Holisticmedical care | 11 | 11.0 |
| | Surgery | 1 | 1.0 |
| Rehabilitation | Physiotherapy | 44 | 44.0 |
| | OT | 2 | 2.0 |
| | Homebased | 3 | 3.0 |
| | Others | 31 | 31.0 |
| | PT + traditional | 10 | 10.0 |
| | PT + homebased | 5 | 5.0 |
| | PT+ speech | 2 | 2.0 |
| | PT + psychiatric | 3 | 3.0 |
| Intensity of treatment | Once a week | 70 | 70.0 |
| | Twice a week | 28 | 28.0 |
| | Thrice a week | 2 | 2.0 |
| Recovery rate | Good | 61 | 61.0 |
| | Moderate | 38 | 38.0 |
| | Poor | 1 | 1.0 |
| Comorbidity | Hypertension | 44 | 44.0 |
| | Diabetes | 14 | 14.0 |
| | Others | 1 | 1.0 |
| | None | 30 | 30.0 |
| | Hypertension + diabetes | 11 | 11.0 |

**Table 3: Employment variables in the validity study**

| Variable | Class | Frequency | Percent (%) |
|---|---|---|---|
| Nature of employment | Temporary | 15 | 15.0 |
| | Casual | 18 | 18.0 |
| | Contract | 5 | 5.0 |
| | Permanent | 62 | 62.0 |
| Time off work | Weeks | 21 | 21.0 |
| | Months | 41 | 41.0 |
| | Years | 38 | 38.0 |
| Renumeration when off work | Yes | 14 | 14.0 |
| | No | 86 | 86.0 |
| Are you required to return to work | Yes | 54 | 54.0 |
| | No | 46 | 46.0 |
| Are you ready to return | No | 100 | 100.0 |
| Any policy for disability at work | Yes | 5 | 5.0 |
| | No | 95 | 95.0 |
| Type of work | Admin. | 22 | 22.0 |
| | Technician | 12 | 12.0 |
| | Other | 66 | 66.0 |
| Hours of work | 1-3hours | 4 | 4.0 |
| | 4-6hours | 26 | 26.0 |
| | 7-9hours | 44 | 44.0 |
| | 10-14hours | 26 | 26.0 |
| Shift duty | Yes | 11 | 11.0 |
| | No | 89 | 89.0 |
| Does your work include travelling | Yes | 38 | 38.0 |
| | No | 62 | 62.0 |
| Desk or office bound work | Desk work | 15 | 15.0 |
| | Office work | 40 | 40.0 |
| | Others | 45 | 45.0 |
| Communication | Speak fluently | 54 | 54.0 |
| | I don't have to speak fluently | 46 | 46.0 |
| Writing | I must write legibly | 30 | 30.0 |
| | I don't need to write legibly | 70 | 70.0 |
| Communicating with people | Daily | 79 | 79.0 |
| | Once a week | 21 | 21.0 |

## DOMAIN 1 OF IGBO VERSION OF RETURN TO WORK ASSESSMENT SCALE (IRAS)

## PRINCIPAL COMPONENT ANALYSIS (PCA)

This domain 1 of the IRAS is made up of Forty-three items and were subjected to principal component analysis (PCA) using the SPSS version 23. Prior to performing PCA, the suitability of the data for Factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser Meyer-Olkin value was 0.69, slightly exceeding the recommended value of .6 and Bartlett's Test of Sphericity reached statistical significance, (p=0.001) supporting the factorability of the correlation matrix[25,26,27].

Principal component analysis revealed the presence of eleven components with Eigen factor exceeding1,explaining22.13%,10.74%,7,86%,7.12%,5.17%,4.25%,4.08%,3.68%,3.41%,2.79%,2 .40% of the variance respectively (see fig 1). An inspection of the scree plot revealed a clear break after the fifth component. Using the Cartel's scree test[28], it was decided to retain five components for further investigations (see fig 2) This was further supported by the result of the Monte Carlos PCA for parallel analysis (see table 4), which showed only five components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the sample size (42 variables ×100 respondent)

The five components solution explained a total of 53.01% of the variance, with Component 1 contributing 22.13%, Component 2 contributing 10.74%, Component 3 contributing 7.86%, Component 4 contributing 7.12%, and Component 5 contributing 5.17%. To aid in the interpretation of these five components, oblimin rotation was performed. The rotated solution revealed the presence of simple structure[29], with five components showing a number of strong loadings and all variables loading substantially on only three component and negative affect items loading strongly on components 4 and 5.The interpretation of the five components was consistent with previous researches on the RAS Scale, with positive affect items loading strongly on Component 1 and 2 and negative affects items loading strongly on Components 3, 4 and 5.

## DOMAIN 2 OF IGBO VERSION OF RETURN TO WORK ASSESSMENT SCALE (IRAS)

**PRINCIPAL COMPONENT ANALYSIS (PCA)**

This domain 2 of the IRAS is made up of Twenty-two items and were subjected to principal component analysis (PCA) using the SPSS version 23. Prior to performing PCA, the suitability of the data for Factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser Meyer-Olkin value was 0.80, slightly exceeding the recommended value of .6 and Bartlett's Test of Sphericity reached statistical significance, (p=0.001) supporting the factorability of the correlation matrix[25,26].

Principal component analysis revealed the presence of six components with Eigen factor exceeding 1, explaining31.96%,11.3%,7.74%,7.12%,6.3%5.08% of the variance respectively (see fig 3). An inspection of the scree plot revealed a clear break after the fourth component. Using the Cartel's scree test[28], it was decided to retain five components for further investigations (see fig 4). This was further supported by the result of the Monte Carlos PCA for parallel analysis (see Table 5), which showed only five components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the sample size (22 variables ×100 respondent).

The four components solution explained a total of 53.12% of the variance, with Component 1 contributing 31.96%, Component 2 contributing 11.30%, Component 3 contributing 7.74%, Component 4 contributing 7.12%. To aid in the interpretation of these five components, oblimin rotation was performed. The rotated solution revealed the presence of simple structure[29], with four components showing a number of strong loadings and all variables loading substantially on only one component and negative affect items loading weakly on components 2 and 4 .The interpretation of the four components was consistent with previous researches on the RAS Scale, with positive affect items loading strongly on all the Component and negative affects items loading weakly on Components 2 and 4. The bland-AltmanThe interpretation of the four components was consistent with previous researches on the RAS Scale, with positive affect items loading strongly on all the Component and negative affects items loading weakly on Components 2and 4 (see table 5), which showed only five components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the sample size (42 variables ×100 respondent)

The three components solution explained a total of 61.59% of the variance, with Component 1 contributing 32.41%, Component 2 contributing 15.15%, Component 3 contributing 10.04%. To aid in the interpretation of these five components, oblimin rotation was performed. The rotated solution revealed the presence of simple structure[28], with three components showing a number of strong loadings and all variables loading substantially on only one component and negative affect items loading moderately on components 2 and 3 .The interpretation of the five components was consistent with previous researches on the RAS Scale, with positive affect items loading strongly on all three Component 1 and 2 and negative affects items loading moderately on Components 2 and 3.

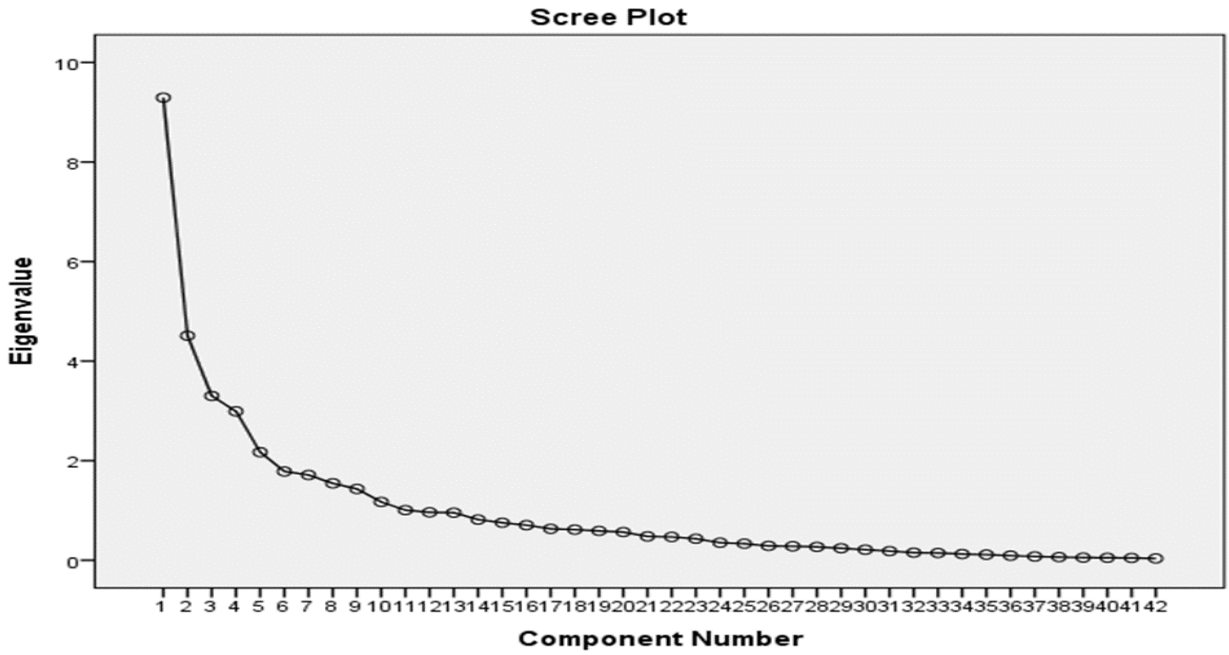



Fig 1: Scree plot of Domain 1 before direct oblimin rotation.

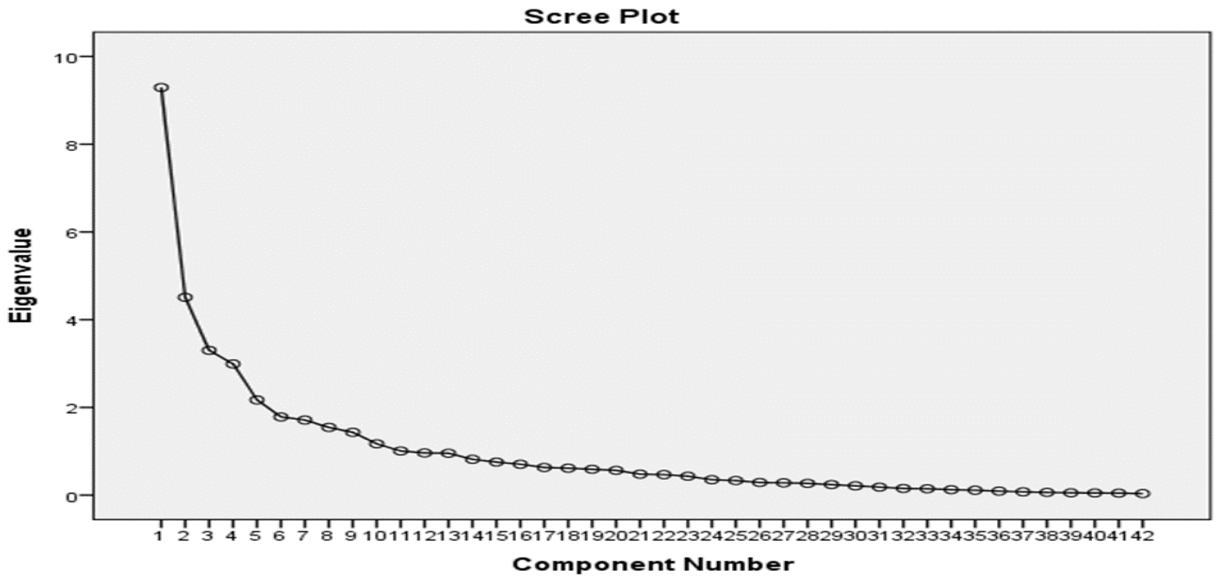



Figure 2: Scree plot of Domain 1 after direct oblimin rotation.

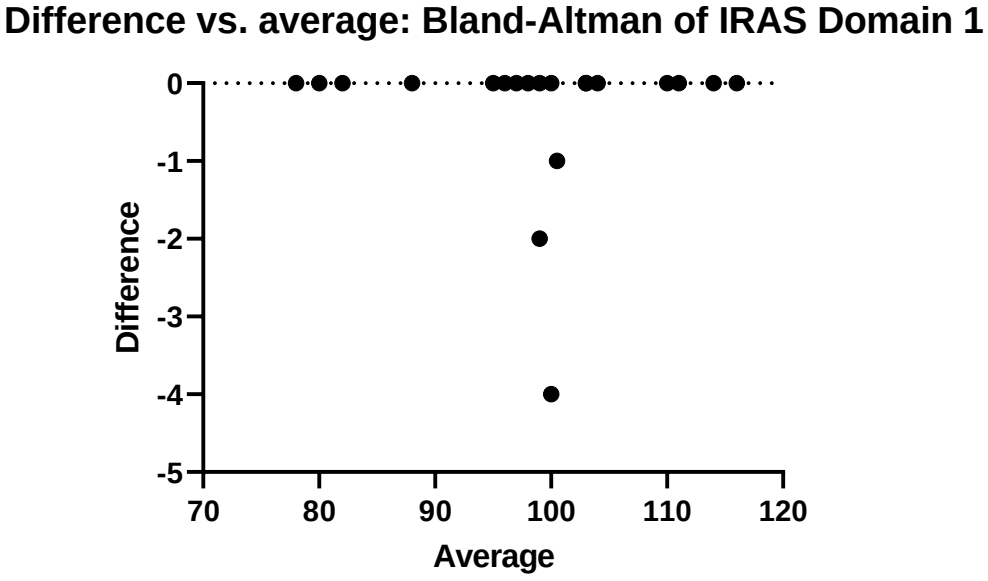



Fig 3: Bland-Altman plot of test-retest scores of Domain1 of IRAS.

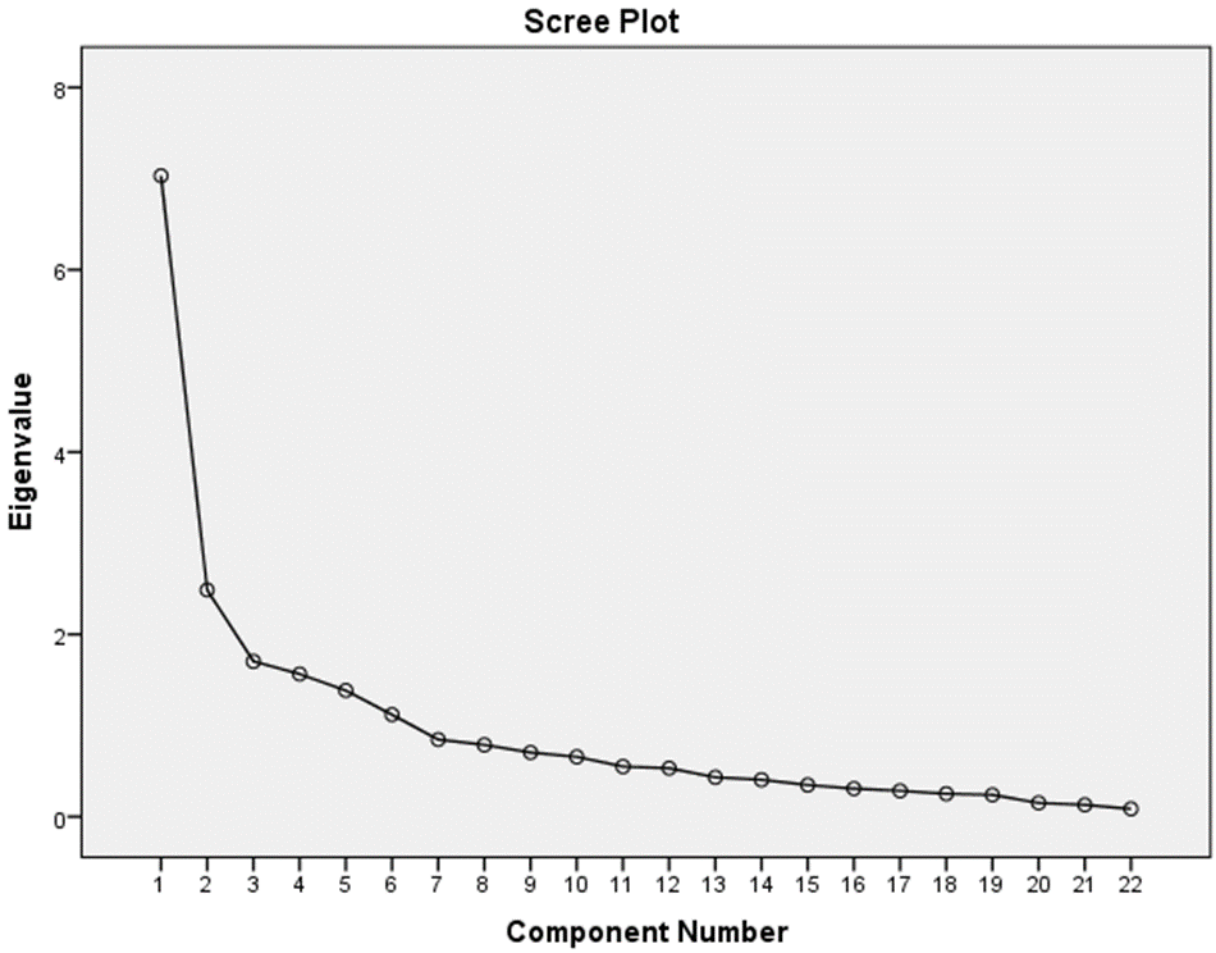



Fig 4: Scree plot of Domain 2 before the direct oblimin rotation

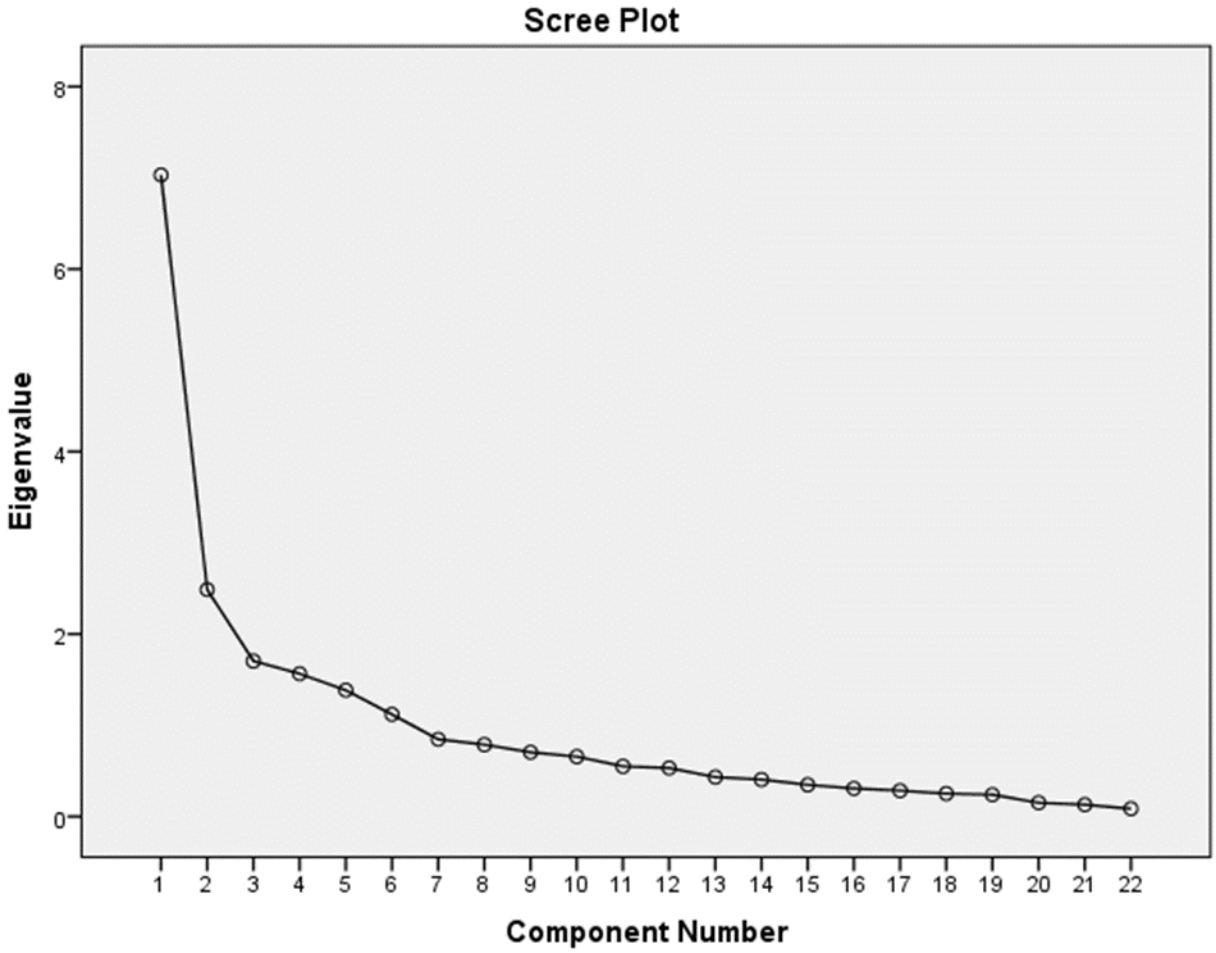



Fig 5: Scree plot of Domain 2 after Direct Oblimin rotation.

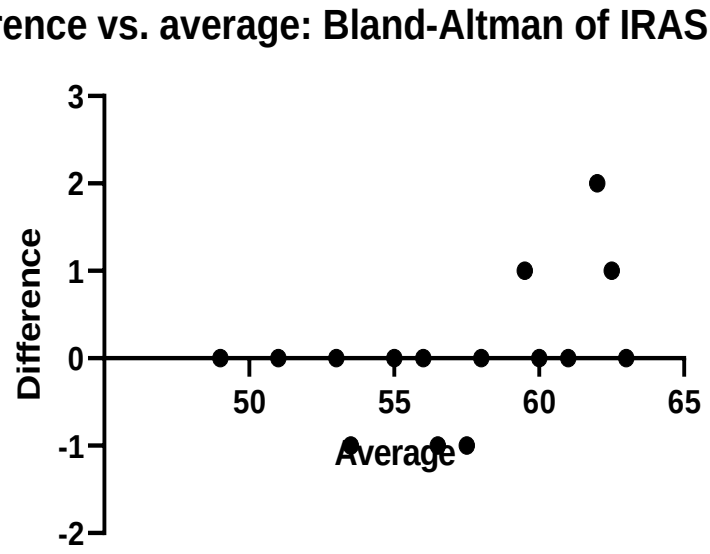



**Fig 6: Bland-Altman plot of test-retest scores of Domain 2 of IRAS.**

**DOMAIN 3 OF IGBO VERSION OF RETURN TO WORK ASSESSMENT SCALE (IRAS)**

**PRINCIPAL COMPONENT ANALYSIS (PCA)**

This domain 3 of the IRAS is made up of Nineteen items and were subjected to principal component analysis (PCA) using the SPSS version 23. Prior to performing PCA, the suitability of the data for Factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser Meyer-Olkin value was 0.79, slightly exceeding the recommended value of .6 and Bartlett's Test of Sphericity reached statistical significance, (p=0.001) supporting the factorability of the correlation matrix[25,26,27].

Principal component analysis revealed the presence of eleven components with Eigen factor exceeding 1, explaining 36.41%, 15.15%, 10.04%, 6.01%, and 5.41% of the variance respectively (see fig 5). An inspection of the scree plot revealed a clear break after the fifth component. Using the Cartel's scree test[28], it was decided to retain five components for further investigations (see fig 6) This was further supported by the result of the Monte Carlos PCA for parallel analysis (see table 6), which showed only five components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the sample size (42 variables ×100 respondent)

The three components solution explained a total of 61.59% of the variance, with Component 1 contributing 32.41%, Component 2 contributing 15.15%, Component 3 contributing 10.04%. To aid in the interpretation of these five components, oblimin rotation was performed. The rotated solution revealed the presence of simple structure[29], with three components showing a number of strong loadings and all variables loading substantially on only one component and negative affect items loading moderately on components 2 and 3 .The interpretation of the five components was consistent with previous researches on the RAS Scale, with positive affect items loading strongly on all three Component 1 and 2 and negative affects items loading moderately on Components 2 and 3

**Cronbach Alpha and Test-retest reliability of the Igbo version of Return to work assessment scale (IRAS)**

The IRAS has good internal consistency, with a Cronbach Alpha coefficient reported for Domain 1 as 0.856, Domain 2 as 0.86 and Domain 3 as 0.87.

Test-retest reliability analysis gave an ICC of 0.99(p=0.001) for Domain 1, Domain 2 an ICC of 0.99(0.001), Domain 3 an ICC of 0.99(0.001).The graphic representation of the test retest scores by the Bland-Altman method revealed the limit of agreement for the two scoresin Domain 1 were from-2.29 to 1.58, Domain 2 to be -1.30 to 1.40 and Domain 3 to be -0.8 to 0.72(Fig 3, 6, 9)

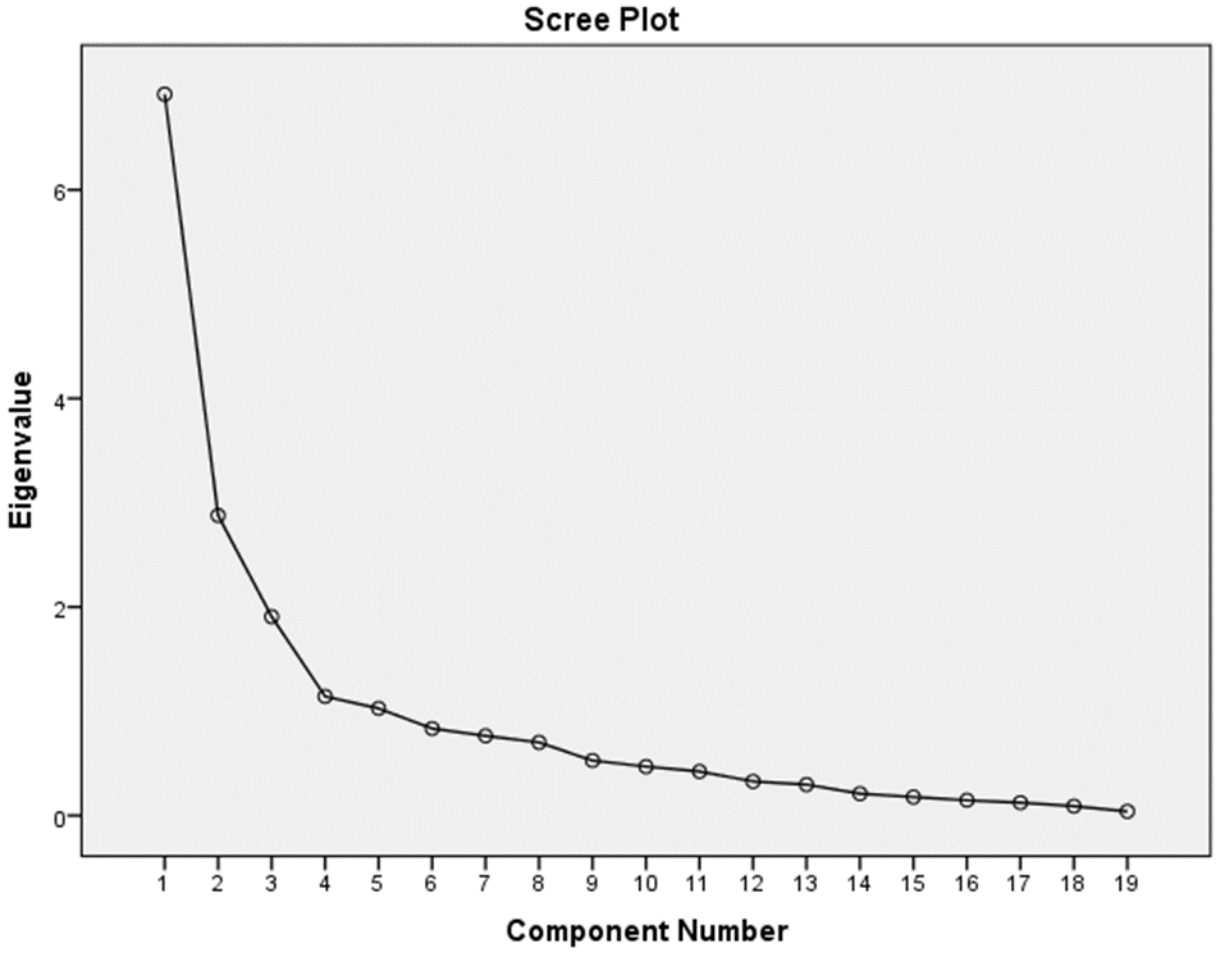



Figure 7: Scree plot of Domain 3 of RAS before Oblimin rotation.

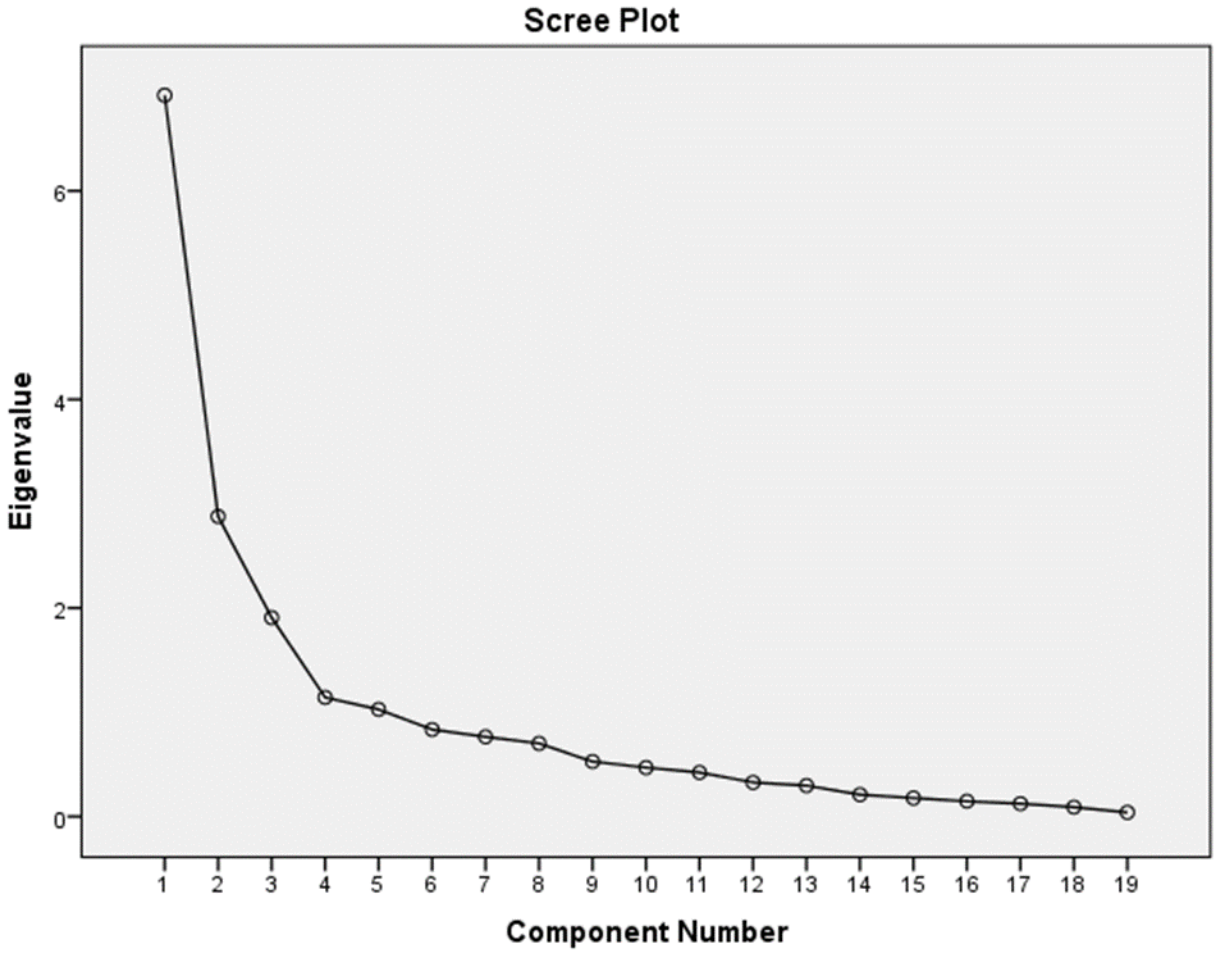



Figure 8: Scree plot of Domain 3 of RAS after Oblimin rotation

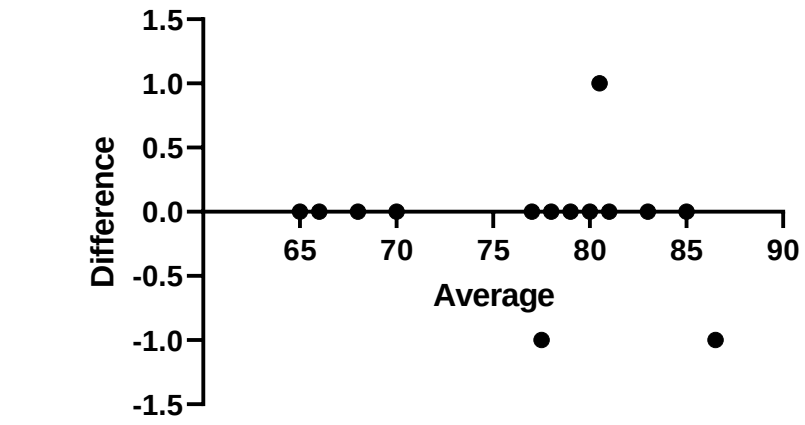



**Fig 9: Bland-Altman plot of test-retest scores of Domain 3 of IRAS.**

**Table 4: Comparison of Eigen values from PCA and criterion values from parallel analysis (Domain 1 of IRAS).**

| Component number | Actual eigen value from PCA | Criterion value from parallel analysis | Decision |
|---|---|---|---|
| 1 | 9.293 | 2.5353 | Accept |
| 2 | 4.510 | 2.3199 | Accept |
| 3 | 3.301 | 2.1832 | Accept |
| 4 | 2.991 | 2.0608 | Accept |
| 5 | 2.171 | 1.9497 | Accept |
| 6 | 1.784 | 1.8492 | Reject |
| 7 | 1.712 | 1.7630 | Reject |
| 8 | 1.545 | 1.6765 | Reject |
| 9 | 1.432 | 1.6002 | Reject |
| 10 | 1.171 | 1.5274 | Reject |
| 11 | 1.007 | 1.4544 | Reject |

**Table 5: Comparison of eigen values from PCA and criterion values from parallel analysis (Domain 2 of IRAS)**

| Component number | Actual eigen value from PCA | Criterion value from parallel analysis | Decision |
|---|---|---|---|
| 1 | 7.031 | 1.9659 | Accept |
| 2 | 2.487 | 1.7694 | Accept |
| 3 | 1.703 | 1.6501 | Accept |
| 4 | 1.565 | 1.5343 | Accept |
| 5 | 1.385 | 1.4278 | Reject |
| 6 | 1.119 | 1.3401 | Reject |

**Table 6: Comparison of Eigen values from PCA and criterion values from parallel analysis (Domain 3 of IRAS)**

| Component number | Actual eigen value from PCA | Criterion value from parallel analysis | Decision |
|---|---|---|---|
| 1 | 6.917 | 1.8803 | Accept |
| 2 | 2.878 | 1.6964 | Accept |
| 3 | 1.907 | 1.5549 | Accept |
| 4 | 1.142 | 1.4427 | Reject |
| 5 | 1.028 | 1.3429 | Reject |

## DISCUSSION

### Cross-cultural Adaptation of the English version of RAS into Igbo culture and environment.

Adaptation of the RAS into the Igbo culture and environment was performed following a systematic standardized approach. All items but one (1) on the original version of RAS was judged by the expert panel to be relevant in clinical research post stroke survivors willing to go back to work and for clinicians managing such patients, living in the South- Eastern Nigeria or Igbo land). Modifications were also made in order to ensure semantic, experiential and conceptual equivalence of the terms and examples in Igbo environment [18,30].

The terms {''Right'', ''Left''} in the original RAS were replaced with Igbo culture conceptually equivalent terms. This is in line with recommendations by Beaton *et al.*,[31] that a newly adapted scale should contain terms that are conceptually equivalent in the new culture as the original version is the culture for which it was developed. In the English language, the term ''Right'' refers to being morally good, acceptable, restore to upright position. In Igbo language, the term ''Right hand'' can replace ''Right'' in this context because Right in Igbo means -it is good, it is morally acceptable, it is of good moral standard- the same with some English language meaning of Right. While Right hand is the term used in Igbo language to refer to anything that is the opposite of the left hand/side. Since ''right hand side'' is more specific to the item in the question and eliminates any error of broad/general outcomes possible, it was used to replace ''Right'' in items 4 and 5 of section A. The above explanation goes for the replacement of ''Left'' with ''Left hand'', where in English language, left means – anything remaining, and a position towards the west. Left in Igbo language means anything remaining, hence, the culturally equivalent term of ''left hand'' was adapted. Good/moderate/poor options for item 14 of section A refers to/explains levels of a condition or situation, but in Igbo language, these gradings don't appear alone. They have ''it is'' attached to it- addressing the condition specifically. Hence, ''it is good'', ''it is moderate'', and ''it is poor''were adapted for use being their semantic equivalent.

The terms ‘‘Temporary’’, ‘‘Casual’’, ‘‘Contract’’, and ‘‘Permanent’’ which are options to item 16 of section Arefers to all their individual meanings but with no reference to ‘‘work’’ which is the subject in question and Igbo language has proven to be a language with lots of specificity than generalization. Hence, ‘‘Temporary Work’’, ‘‘Casual Work’’, ‘‘Contract Work’’, and ‘‘Permanent Work’’ were adapted for use in the IRAS being the options’ experiential equivalent. The terms in items 17, 18, 24, 25 of section A; RAS Domain 1 response options; RAS Domain 2 response options and RAS Domain 3 response options {‘‘Period off from work’’, ‘‘Renumeration during time off’’, ‘‘Does work include shifts’’, ‘‘Does work include travel’’, ‘‘Unable to’’, ‘‘With assistance’’, ‘‘Independently’’, ‘‘Sure’’, Unsure’’, ‘‘Never thought about it’’, ‘‘Definitely disagree’’, ‘‘Mostly disagree’’, ‘‘Neither agree nor disagree’’, ‘‘Mostly agree’’, ‘‘Definitely agree’’} were adapted to their personalized form {‘‘Period you were off from work’’, ‘‘Renumeration during time you were off’’, ‘‘Does your work include shifts’’, ‘‘Does your work include travel’’, ‘‘I am unable to’’, ‘‘I will need assistance’’, ‘‘I am independent’’, ‘‘I am sure’’, I am unsure’’, ‘‘I’ve never thought about it’’, ‘‘I definitely disagree’’, ‘‘I mostly disagree’’, ‘‘I neither agree nor disagree’’, ‘‘I mostly agree’’, ‘‘I definitely agree’’} to fit the Igbo language lexis and structure.

The term ‘‘general’’ in ‘‘general work hours’’ of item 23 was replaced with ‘‘Daily work hours’’, because general does not give a specific yardstick/guideline to which the work hours can be calculated and evaluated in the construct of study. The sentence ‘‘I can use the bathroom’’ in item no: 5 in Domain 1 was replaced with ‘‘I can take care of my personal grooming and appearance when outside’’. In Igbo language, ‘‘I can use the bathroom’’simply means ‘‘to bath (and possibly toileting)’’, whereas in the context, it refers to personal grooming (especially in a social gathering). Hence, its replacement with an understanding that reflects its conceptual meaning and cultural adaptation equivalent.

The term ‘‘I don’t need an elevator to ascend my office’’ was removed by the expert panel committee because it doesn’t reflect the structures often found in the South -Eastern region of Nigeria. In item 19, the word ‘‘Cordial’’ in ‘‘my employer takes the cordial relationship of colleagues seriously’’ was replaced with ‘‘Sibling’’

because the word sibling is more appropriate and brings out the concept of the item.

The culturally adapted Igbo version of RAS (IRAS) was then pretested on twenty (20) post stroke survivors. All the participants indicated clarity of language and ease of understanding of all the items. The participants also reported that the culturally adapted IRAS was relevant since the questions asked are specific to their condition. Hence no further adjustment was made by the expert panel on any of the items on the IRAS.

Participants took a similar length of time (10 minutes) to complete the IRAS when compared with the original English version of ERAS[2].

**Psychometric properties of the cross-culturally adapted Igbo version of the Return-to-work Assessment Scale**

The results obtained from this study showed that there was significantly high internal consistency reliability with ICC of 0.99(p=0.001) for domain 1, 0.99 (p=0.001) for domain 2, and 0.99 (p=0.001) for domain 3 between the scores obtained on the first and second administration of the Igbo RAS using the Intra-Class Correlation (ICC). As expected, this high internal consistency reliability score is similar to that reported by Igwesi-Chidobe *et al.*,[31]. In their study on cross-cultural adaptation of the WHODAS 2.0 and validation in rural and urban Nigerian populations with Chronic Low Back Pain (CLBP), a correlation of 0.81-0.93 was obtained. Ibikunle *et al.*, also reported a high ICC of 0.99 in their study on translation, cultural adaptation and validation of the Igbo version of DASH[18]. The results obtained from this study showed excellent reliability with Test retest reliability analysis for domain 1, 2, and 3 between the scores obtained on the first and second administration of the Igbo RAS using the Intra-Class Correlation (ICC).The graphic analysis by the Bland-Altman plotting method revealed that the test retest result are strictly centred in Domain 1,but not totally in Domain 2 and 3.This is similar to the works of Stevenlink *et al.*,[32] in Nepal in the testing the psychometrics of the P scale and Ibikunle et al.,[33,34] in their study in while testing the psychometrics of the IP scale(igbo version of the Participation scale) and while testing the psychometrics of I-SALSA(Igbo version of the screening of activity limitation and safety awareness scale) in Nigeria.The result of this study was also similar to the work of Fèdou *et al.*, [35],in their translation and cross cultural

adaptation of the Readiness for Return-to-work scale (RRTWs) into French (RRTWs-F) for patients who have not yet returned to work. Cronbach's alphas were satisfactory in four dimensions and reliability was quite good.

The reliability and internal consistency of the three(3) Domains of the IRAS were similar to those of the original English version {Cronbach's alpha coefficient of 0.81 for Domain 1, 0.93 for Domain 2 and 0.76 for Domain 3; an ICC of 0.85(p=0.001) for Domain 1, Domain 2 an ICC of 0.91 (p=0.001) and Domain3 an ICC of 0.99 (p=0.001)} Ibikunle *et al.,*[3], to that of Fèdou *et al.,*[36] translation and cross cultural adaptation of the Readiness for Return-to-work scale (RRTWs) into French (RRTWs-F) for patients who have not yet returned to work. Cronbach's alphas were satisfactory (0.62-0.88) in four dimensions and reliability was quite good (0.71-0.85).

The results from this study showed that there was a significant correlation ($p<0.001$) between the scores obtained on the English and Igbo versions of RAS. This correlation is similar to the report by Ibikunle et al., on the translation, adaptation and validation of the Igbo version and the English version of DASH[18]. Excellent correlation coefficient was observed between the items in the English and Igbo version of RAS which suggests that IRAS was excellently translated and culturally adapted to the Igbo culture and environment.

This suggests that IRAS is a valid instrument for assessing return to work in post stroke survivors in the South-Eastern region (Igbo speaking) of Nigeria.

## CONCLUSION

The Igbo version of Return-to-work Assessment Scale (IRAS) is a valid, reliable and internally consistent tool for assessing readiness to return to work in Igbo stroke survivors.

## RECOMMENDATION

Based on the findings of this study, the following recommendations are made

1 The Igbo version of RAS (IRAS) should be used by clinicians and researchers to assess and evaluate post stroke survivors progress, ability and readiness to return to work in Igbo communities in Nigeria and the world at large.

1. Translation of the English version of RAS (ERAS) questionnaire into the other major and indigenous Nigerian languages should be done to enhance its use across the various cultures in Nigeria and beyond wherever those language monolinguals are found.

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