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Original article

Low public awareness of aphasia despite high stroke awareness: a three-city cross-sectional study from Bosnia and Herzegovina

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Summary

Introduction. Aphasia is an acquired language disorder most commonly caused by stroke, but public awareness remains low. No systematic assessment of aphasia awareness has been published in Bosnia and Herzegovina. The aim of this work was to assess aphasia awareness among residents of Bileća, Banja Luka and Sarajevo.

Methods. A cross-sectional convenience sample of 150 adults (67 men, 83 women; 18–78 years) was recruited in public spaces. An adapted Aphasia Awareness Survey was administered after translation and piloting. Descriptive statistics and chi-square tests were used.

Results. A total of 67.3% of respondents (95% CI: 59.8–74.8) had never heard the term "aphasia", while 32.7% had. Among the latter, 38.8% correctly defined aphasia as a language disorder, meaning 12.7% (95% CI: 7.3–18.0) of the total sample could define it correctly. Stroke awareness was 98.7% (95% CI: 96.8–100.0). No significant sex difference for aphasia awareness was found (χ^2=2.08, p=0.150). Borderline difference for stroke awareness was (χ^2=3.79, p=0.051). Age groups (<30 vs ≥30 years) showed identical proportions (32.7% each). Education was significantly associated with aphasia awareness (χ^2=6.42, p=0.040). Most respondents (60.0%) did not know the cause of aphasia; 36.7% correctly identified brain damage.

Conclusion. Awareness of aphasia is very low despite high stroke awareness. Education campaigns explicitly linking aphasia to stroke are needed. Education had a small-to-moderate association (Cramer's V=0.21). Findings are limited by the convenience sample.

Key words: aphasia, aphasia awareness, public knowledge, Bosnia and Herzegovina, cross-sectional survey

Introduction

Aphasia is an acquired language disorder most commonly resulting from a stroke. It is characterised by deficits in both language production and comprehension, affecting all language modalities: spontaneous speech, auditory comprehension, repetition, naming, reading, and writing [1].

Depending on the clinical presentation and lesion location, several aphasic syndromes are distinguished: Wernicke's aphasia, Broca's aphasia, global aphasia, transcortical motor aphasia, transcortical sensory aphasia, mixed transcortical aphasia, anomic aphasia, and conduction aphasia [1].

Treatment is typically long-term and requires support from family members and the broader community [2]. Although aphasia is not a rare disorder, public awareness remains unsatisfactory, as documented internationally [3–5]. Low public awareness may contribute to delayed recognition, reduced social inclusion, communication stigma, and poorer rehabilitation experiences among individuals with aphasia. Public understanding is therefore considered as an important component of post-stroke care and community reintegration. In Bosnia and Herzegovina, no such study has been conducted to date. The aim of this study was to assess aphasia awareness among the general population, comparing three urban centres (Bileća, Banja Luka, Sarajevo).

Methods

Study design and setting

This cross-sectional survey was conducted during 2024 in three Bosnian-Herzegovinian cities: Bileća and Banja Luka (Republic of Srpska), and Sarajevo (Federation of Bosnia and Herzegovina). Data collection took place in public spaces (shopping centres, parks, pedestrian zones). Public-space recruitment was selected to maximise heterogeneity of respondents from different age, occupational, and educational backgrounds.

Participants

A convenience sample of 150 adults (≥ 18 years) was recruited. Exclusion criteria were inability to complete the survey independently (e.g., severe cognitive or sensory impairment). No monetary incentive was provided.

Instrument and adaptation

The Aphasia Awareness Survey [2] – originally adapted from Code et al. [3] – was used. The questionnaire included sections on assessment details, respondent demographics (age, sex, education, occupation), and open-ended questions about aphasia and stroke. Responses were categorised as correct, partially correct, or incorrect.

Adaptation process: The instrument underwent forward-backward translation from English to Bosnian/Serbian by two independent translators, followed by reconciliation. A third translator back-translated the version into English; discrepancies were resolved by consensus. Cultural adaptation was reviewed by a panel of three speech-language therapists familiar with the local healthcare system. A pilot test was conducted on 15 respondents (not included in the final sample) to check clarity and comprehension. No formal internal consistency (e.g., Cronbach's alpha) was calculated because the items were not intended to constitute a unidimensional scale. Similar cross-cultural adaptation and validation procedures have been used successfully in neighbouring countries [6].

Variables and definitions

Consistent with previous studies [3–5, 7], we defined:

- Awareness of aphasia – having heard the term "aphasia".
- Knowledge of aphasia – ability to provide a correct definition (i.e., "a language disorder caused by brain damage").
- Stroke awareness – having heard the term "stroke".

Examples of correct responses for the cause of aphasia included "brain damage", "stroke", or "injury to the brain". Incorrect responses included "emotional problems" or "intellectual disability".

Ethical considerations

The study was approved by the Ethics Committee of the Faculty of Special Education and Rehabilitation, University of Belgrade (approval No. 123/2024). All participants gave written informed consent before enrolment. The study followed the principles of the Declaration of Helsinki.

Statistical analysis

Data were analyzed using SPSS version 24.0. Descriptive statistics (frequencies, percentages, 95% confidence intervals) were calculated. Group comparisons were made using chi-square tests (or Fisher's exact test when expected cell frequencies were <5). Effect sizes (Cramer's V or phi coefficient) were reported. The significance level was set at $p \leq 0.05$ (two-tailed). Post-hoc pairwise comparisons for educational level were performed using z-tests for proportions with Bonferroni correction (adjusted $p < 0.017$).

Results

Sample characteristics

Table 1 summarises the demographic composition of the 150 respondents, including city distribution, sex, age groups, and educational levels.

Table 1. Demographic characteristics of the sample (N = 150)

Variable	Category	n	%
City	Sarajevo	70	46.7
	Banja Luka	55	36.7
	Bileća	25	16.7
Sex	Men	67	44.7
	Women	83	55.3
Age group	<30 years	49	32.7
	≥30 years	101	67.3
Education	Secondary	92	61.3
	University degree	53	35.3
	Master's/PhD	5	3.3

As shown in Table 1, the largest subgroup came from Sarajevo (46.7%), women slightly out-

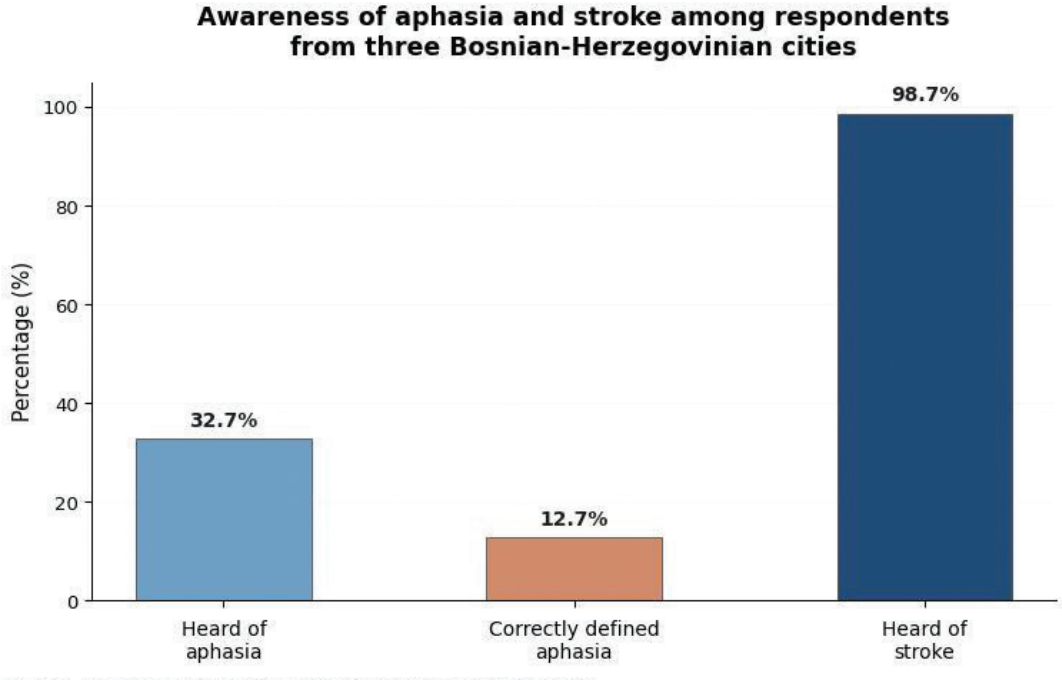

Figure 1. Awareness of aphasia and stroke among 150 respondents.

Figure 1. Awareness of aphasia and stroke among 150 respondents from three Bosnian-Herzegovinian cities

numbered men (55.3%), and most respondents (67.3%) were aged 30 years or older. Secondary education was the most common (61.3%).

Awareness of aphasia and stroke

Of 150 respondents, 101 (67.3%; 95% CI: 59.8–74.8) had never heard the term "aphasia", while 49 (32.7%) reported that they had heard of it. Among those 49 respondents, only 19 (38.8%) were able to correctly define aphasia as a language disorder. Consequently, only 12.7% (95% CI: 7.3–18.0) of the total sample correctly identified aphasia. In contrast, awareness of stroke was nearly universal, with 148 of 150 respondents (98.7%; 95% CI: 96.8–100.0) reporting familiarity with the term.

As shown in Figure 1, awareness of stroke was substantially higher than both awareness and correct understanding of aphasia among respondents from the three surveyed cities.

The figure demonstrates a pronounced discrepancy between general awareness of stroke and awareness of aphasia, suggesting that public understanding of post-stroke communication disorders remains limited despite widespread recognition of stroke itself.

This finding supports the need for targeted educational strategies explicitly linking aphasia with stroke and its long-term communication consequences.

Awareness of aphasia by subgroup

Table 2 presents aphasia awareness (having heard the term) stratified by sex, age, education, and city, along with p-values for group comparisons.

The data in Table 2 showed no significant differences by sex or age. Education was significantly associated with aphasia awareness ($p = 0.040$), with university graduates showing higher awareness (45.3%) than those with secondary education (25.0%). City-level differences were not statistically significant ($\chi2 = 3.29$, $df = 2$, $p = 0.193$, Cramer's $V = 0.15$), although Sarajevo had the highest observed proportion (40.0%).

Table 2. Awareness of aphasia by subgroup

Variable	Category	Heard of aphasia n (%)	p value
Sex	Men	26/67 (38.8)	0.150
	Women	23/83 (27.7)	
Age group	<30 years	16/49 (32.65)*	1.000
	≥30 years	33/101 (32.67)*	
Education	Secondary	23/92 (25.0)**	0.040
	University degree	24/53 (45.3)**	
	Master's/PhD	2/5 (40.0)	
City	Bileća	6/25 (24.0)	0.193
	Sarajevo	28/70 (40.0)	
	Banja Luka	15/55 (27.3)	

**Exact proportions: 16/49 = 32.65%, 33/101 = 32.67% – approximately identical.*
***Post-hoc: university vs. secondary, p = 0.012 (Bonferroni-corrected)*

Knowledge of the cause of aphasia

When asked "What causes aphasia?", respondents' answers are summarised in Table 3.

Table 3. Knowledge of the cause of aphasia (N = 150)

Response	n	%
Brain damage (correct)	55	36.7
Don't know	90	60.0
Incorrect (emotional problems / intellectual disability)	5	3.3

As seen in Table 3, the majority of respondents (60.0%) could not identify any cause of aphasia. Only 36.7% correctly mentioned brain damage, stroke, or injury to the brain. Incorrect answers were rare (3.3%). No sex difference was found in knowledge of cause ($\chi2 = 0.505$, $p = 0.918$).

Association between stroke and aphasia awareness

Among those who had heard of aphasia, 46 (93.9%) had also heard of stroke, while 3 (6.1%) had not. Fisher's exact test showed a significant association ($p = 0.033$, $\varphi = 0.21$). However, due to near-ceiling stroke awareness, this finding should be interpreted cautiously.

Discussion

This study provides the first systematic assessment of aphasia awareness in Bosnia and Herzegovina. The key finding is that only 12.7% of the sample could correctly define aphasia, whereas stroke awareness is nearly universal (98.7%). As illustrated in Figure 1, the gap between stroke awareness and aphasia awareness is striking. This substantial awareness gap mirrors results from neighbouring countries [4] and international studies [3, 7]. For example, Vuković et al. [4] reported aphasia awareness rates of 35% in Serbia and 32% in Montenegro. Code et al. [3] originally documented similarly low levels across multiple countries, and a subsequent international pattern analysis confirmed persistent low awareness globally [7]. A comprehensive review by Code [13] further emphasized that despite decades of research, public knowledge of aphasia remained critically low worldwide, with few exceptions. Longitudinal studies suggest that awareness can improve slowly over time [10]; our findings indicate that Bosnia and Herzegovina still lags behind many other regions.

Why is aphasia awareness so low despite high stroke awareness? Several factors may explain this gap. First, public health campaigns predominantly focus on stroke prevention and acute symptoms (facial droop, arm weakness, speech difficulty - "FAST"), but rarely mention that "speech difficulty" may be aphasia or that language problems can persist after stroke. Second, media portrayals of stroke survivors often omit communication disabilities or conflate aphasia with cognitive impairment. Third, healthcare professionals may not consistently explain the term "aphasia" to patients and families, instead they use non-technical phrases like "trouble speaking". Healthcare workers may also have insufficient knowledge of aphasia, as shown in a recent Chinese study [12]. Fourth, stigma around language disorders may discourage open discussion. Qualitative studies have shown that individuals with aphasia often perceive that the public misunderstands their condition [8]. Low awareness may also negatively affect quality of life, as reliable instruments such as the SAQOL-39 [9] have demonstrated in similar populations.

Demographic factors and theoretical framework

Education was the only significant demographic correlate, but its effect size was small-to-moderate (Cramer's $V = 0.21$). This finding aligns with the Knowledge Gap Theory [17], which posits that individuals with higher education acquire and retain health information from mass media more effectively than those with lower education. In Bosnia and Herzegovina, where no national aphasia awareness campaign exists, media reports on stroke rarely use the term "aphasia", instead employing lay expressions such as "speech problems". This may explain why even among those who have heard of aphasia, only 38.8% could define it correctly – superficial exposure without conceptual understanding. Higher education not only increases exposure to written and digital media but also facilitates recognition of medical terminology derived from classical languages (e.g., a-phasia = without speech). Sex and age showed no meaningful association – a finding consistent with some [4] but not all [5] previous studies. The lack of city-level differences indicates that low awareness is uniform across the studied urban centres, implying a nationwide issue.

Comparison with other international studies

These findings align with studies in other countries. In Switzerland, Engelter et al. [14] documented high stroke awareness but limited knowledge of aphasia as a consequence, particularly among older adults and those with lower education. In Turkey, Maviş [15] found that although public awareness of aphasia was low, physicians (including speech-language therapists) were the most trusted source of information, highlighting their crucial role in awareness campaigns. In Canada, Patterson et al. [16] reported that age, sex, and occupation significantly influenced aphasia awareness, with younger individuals and healthcare professionals being more likely to have heard of the disorder – yet most still could not define it accurately. A recent study in Malaysia [18] also found very low aphasia awareness (only 14.5% of the general public had heard of it), which is strikingly similar to our findings. Together, these studies point to a universal pattern of low but strongly profiled aphasia awareness, where socio-demographic characteristics and education play a critical, but not exclusive role.

Implications for public health and clinical practice

This substantial awareness gap warrants targeted educational interventions. Simple, consistent messages should be disseminated: "A stroke can cause aphasia – a difficulty understanding language or speaking, not a problem with intelligence." Suitable channels include general practitioner waiting rooms, pharmacy leaflets, social media campaigns, and community rehabilitation centres. Brief training for healthcare workers (nurses, emergency personnel, general practitioners) on how to introduce the term "aphasia" could improve patient understanding and reduce stigma. National and international organisations such as the National Aphasia Association [19] provides ready-to-use materials that could be adapted for the Bosnian context. As Code [13] notes, raising awareness is the first step toward improving long-term outcomes for people with aphasia. In Bosnia and Herzegovina, there is currently no specialised patient organisation for aphasia.

Strengths and limitations

Strengths: first study from Bosnia and Herzegovina; three-city design; use of an internationally recognised instrument; reporting of confidence intervals and effect sizes.

Limitations:

- Convenience sample (n=150) from only three cities – not representative of the entire country.
- Public space recruitment excluded homebound individuals (e.g., severely ill, elderly, rural residents).
- The questionnaire was adapted but not formally validated (e.g., test-retest reliability, construct validity) for the Bosnian context.
- Social desirability bias may have inflated awareness estimates.
- Health literacy and previous exposure to stroke or aphasia were not assessed and may have influenced awareness levels.
- No data were collected on personal or family history of stroke/aphasia, media consumption, or health literacy.
- Small subgroup sizes (e.g., master's/PhD n=5) limited statistical power for some comparisons.
- Some subgroup analyses may have been underpowered due to small subgroup sizes.

Future research

Large, stratified, random samples covering rural and urban areas across both entities of Bosnia and Herzegovina are needed (e.g., n ≥ 1000). Validated instruments should be developed or formally adapted. Qualitative studies (focus groups, interviews) could explore public perceptions and misconceptions in depth [8]. The role of media, family physicians, and stroke support organisations in raising aphasia awareness should be systematically evaluated. An interventional study – measuring awareness before and after a brief social media campaign – would provide high-level evidence.

Conclusion

Awareness of aphasia among residents of three Bosnian-Herzegovinian cities is very low (only 12.7% of the total sample could correctly define aphasia), despite near-universal recognition of stroke. Education shows a small-to-moderate association with awareness (Cramer's V = 0.21), consistent with the Knowledge Gap Theory, while sex and age show negligible effects. Systematic public education that explicitly connects aphasia with stroke is urgently needed. The limitations of the study preclude generalisation to the whole country; nationwide studies with representative sampling are needed to support evidence-based aphasia awareness strategies in Bosnia and Herzegovina.

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Ethical approval. The Ethics Committee of the Institute Human Research approved the protocol and informed voluntary consent was obtained from all individual respondents and non declinate to participate. The research was conducted according to the Declaration of Helsinki.

Conflicts of interest. The authors declare no conflict of interest.

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Niska javna svijest o afaziji uprkos visokoj svijesti o moždanom udaru: trogradska presječna studija iz Bosne i Hercegovine

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Uvod. Afazija je stečeni jezički poremećaj koji najčešće nastaje usljed moždanog udara, ali svijest javnosti ostaje niska. U Bosni i Hercegovini nijedna sistematska procjena svijesti o afaziji nije objavljena. Cilj ovog rada je bio procjena svijesti o afaziji među stanovnicima Bileće, Sarajeva i Banje Luke.

Metode. Presječni prigodni uzorak od 150 odraslih (67 muškaraca, 83 žene; 18–78 godina) regrutovan je u javnim prostorima. Primijenjena je adaptirana verzija Skale svijesti o afaziji nakon prevoda i pilot testiranja. Korišteni su deskriptivna statistika i hi-kvadrat testovi.

Rezultati. 67,3% (95% CI: 59,8–74,8) nikada nije čulo termin "afazija", dok je 32,7% čulo. Među njima, 38,8% je tačno definisalo afaziju kao jezički poremećaj, što znači da je 12,7% (95% CI: 7,3–18,0) ukupnog uzorka moglo tačno definisati afaziju. Svijest o moždanom udaru iznosila je 98,7% (95% CI: 96,8–100,0). Nije utvrđena značajna polna razlika za svijest o afaziji (χ^2=2,08, p=0,150). Granično značajna razlika uočena je za svijest o moždanom udaru (χ^2=3,79, p=0,051). Starosne grupe (<30 i ≥30 godina) pokazale su identične proporcije (32,7% svaka). Nivo obrazovanja bio je značajno povezan sa sviješću o afaziji (χ^2=6,42, p=0,040). Većina ispitanika (60,0%) nije znala uzrok afazije; 36,7% je tačno identifikovalo oštećenje mozga.

Zaključak. Svijest o afaziji je veoma niska uprkos visokoj svijesti o moždanom udaru. Potrebne su edukativne kampanje koje izričito povezuju afaziju s moždanim udarom. Obrazovanje je pokazalo malu do umjerenu povezanost (Cramer's V=0,21). Nalazi su ograničeni zbog prigodnog uzorka.

Ključne riječi: afazija, svijest javnosti o afaziji, Bosna i Hercegovina, presječna studija