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Addressing the Stroke Knowledge-Action Awareness Gap among Palestinian Adults: A Cross-Sectional Study in the West Bank

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Abstract

Background

Stroke remains one of the most important global health problems, with significant mortality and long-term disability worldwide. Due to the preventability of stroke risk factors and its urgency for treatment, public awareness is essential for early recognition and timely intervention. In this study, we highlight deficiencies in knowledge and awareness, as well as the knowledge-awareness gap to improve stroke prevention and treatment in Palestine.

Methods

This is a supervised-questionnaire-based analytical cross-sectional study in adults in the West Bank. The study excluded healthcare professionals and stroke patients to highlight functional lay-person awareness. We used 2 scales, a newly developed knowledge scale and the STAT action awareness scale with a Cronbach Alpha of 0.77, and 0.93 respectively, then determined the knowledge-awareness gap and characterized its determinants.

Results

Our study had 381 patients with a mean age of 25.72 ± 11.38. Linear regression modeling for the Knowledge score was significant ($R2 = 0.203$, $F(4,376) = 23.93$, $p < 0.001$), likewise our STAT score linear regression model was significant ($R2 = 0.146$, $F(3,377) = 21.43$, $p < 0.001$).

Discussion

Our findings highlight a low prevalence of action awareness and knowledge. While this is consistent with previous literature, we have also measured a discrepancy between stroke knowledge and awareness, which signifies that further public education should focus on golden hour training to improve stroke outcomes.

Background

Stroke remains one of the most important global health problems, with significant mortality and long-term morbidity. Ischemic infarction or intracranial hemorrhage both result in acute neurological deficits following acute hypoperfusion. [1, 2, 3] The global prevalence of strokes is expected to rise as people get older and are continuously exposed to modifiable risk factors. [4] Since many of these factors, including hypertension, smoking, and physical inactivity, are preventable, public awareness is essential for early recognition and timely intervention.

International and regional research consistently reveals that public awareness and knowledge of stroke is remarkably limited. Studies in neighboring Middle Eastern countries frequently demonstrate insufficient awareness of early warning signs, critical risk factors, and low preparedness to respond in emergencies. [5, 6] In Palestine, existing research has been limited to certain groups, such as hospital patients or university students, revealing inconsistent recognition of important symptoms, including unilateral weakness, aphasia, and sensory changes. These studies also demonstrate demographic discrepancies and misconceptions about the severity of stroke, its outcomes, and recovery. [7, 8] There have been multiple studies demonstrating that stroke knowledge and stroke awareness represent distinct constructs with differing scores and weak or absent correlation [9, 10]. While knowledge scores may be moderate to high, the appropriate action in response to a stroke, such as calling the emergency medical services (EMS), remains disproportionately low, highlighting a persistent knowledge–action gap, which has yet to be discussed in regional literature. High stroke knowledge was not related to a decrease in prehospital delay [9, 10].

Despite the increasing prevalence of stroke and the necessity for prompt medical intervention, there has been no recent extensive community-based assessment of stroke knowledge among individuals living in major West Bank cities. This study aims to fill the gap by evaluating the extent of stroke awareness and knowledge among Palestinian adults, particularly focusing on the knowledge-awareness gap, yielding essential evidence to guide focused public health initiatives and enhance national endeavors to improve stroke prevention and reduce disability in Palestine.

Methodology

Population & Sampling

This is a study of Palestinians living in the West Bank, aged 18 and above, conducted between 16/1/2026 and 17/2/2026. We included individuals of varying social statuses, educational levels, and occupations, except for those who have highly advanced professional training in the medical field, mainly physicians, nurses, and medical students. People who had a history of stroke, or did not have the capacity to understand and fill out the questionnaire were also excluded. We excluded patients with stroke history as those patients have direct experience and thus would confound our results, while we believe the impermanence of transient ischemic attacks (TIA) is significant as patients may not take them as seriously, and they likely have inadequate awareness. Due to a lack of a unified population registry, we opted for convenience sampling. An online sample size calculator was used to estimate sample size, which was 381, at a 95% confidence level, and 5% margin of error, with an expected proportion of 45% to ensure an adequate statistical power.

Study design and Data collection

Our study is an analytical cross-sectional study. Based on previous research, we aimed to characterize the gap between adequate stroke knowledge and stroke awareness, and its causes, while providing an updated record of stroke knowledge and action awareness in Palestine. The data was collected by our team in-person using a standardized self-filled questionnaire, to ensure the validity and reliability of our data. Data was collected in areas of high concentration of people, such as trade centers, main streets, and universities.

Questionnaire

Our questionnaire consisted of four sections, encompassing the socio-demographic characteristics of the participants, their medical profile and lifestyle, stroke knowledge including questions about stroke symptoms, stroke risk factors, and stroke's impact on society, with a Cronbach alpha of 0.77, and the stroke action test (STAT), developed and validated by Billings-Gagliardi and Mazor in their study "Development and Validation of the Stroke Action Test". Permission to use this test was granted by the authors [11]. The original test had a Cronbach's alpha of 0.83. Our translated Arabic STAT score had a Cronbach's alpha of 0.93. Our data collection tool was validated in both languages by 3 experts. A pilot study was conducted to assess test-retest reliability, inter-rater reliability, and pilot testing of Cronbach's alpha (Accepted a > = 0.7) for both scales. Our data collection involved 2 authors per participant, who also trained on a standardized approach for data collection.

Data Analysis

Our data was cleaned and analyzed using R version 4.5.2. We conducted univariate analysis in the form of percentages and counts for categorical variables, and measures of dispersion and measures of central tendency, along with normality testing for continuous variables. We then conducted bivariate analysis, and logistic and linear regression for the prediction of knowledge, action awareness, and the gap between the two. Participants were grouped into 4 groups as follows: Adequate knowledge without awareness, adequate awareness without knowledge, adequate knowledge and awareness, and lacking both.

Results

Demographics and Correlations

Our sample included 381 patients. The basic demographics of our sample can be found in Table 1. The medical history and sources of knowledge are summarized in Table 2. 40.68% (n = 155) had adequate stroke knowledge with a mean score of 7.66 ± 2.53, while 21% (n = 80) had adequate awareness with a mean STAT score of 13.54 ± 7.09. 70.32% of participants with good knowledge had inadequate awareness, while 42.5% had adequate action awareness despite lacking stroke knowledge, with only 12.07% of the entire sample possessing both adequate knowledge and awareness (n = 109, n = 34, n = 46). These findings are illustrated in Fig. 1. The knowledge scale answers are summarized in Table 3.

Knowledge and awareness were also associated ($X^2(1) = 11$, $p < 0.001$), and so was their score (rho(379) = 0.24, $p < 0.001$). There was a positive correlation between the STAT score and knowledge score (rho(379) = 0.37, $p < 0.001$).

Table 1
Patient Demographics & Correlations*These correlations are with knowledge/awareness score rather than adequate knowledge/awareness

Demographic	n	%	Knowledge	Awareness
Age:	25.72 ± 11.38	84.25%	rho(379) = 0.34, p < 0.001*	-
18-30	321	13.65%		
30-60	52	2.1%		
60-80	8			
Male	155	40.68%	-	-
Female	226	59.32%		
North	141	37%	X2(2) = 8.79, p = 0.012	H(2) = 6.11,p = 0.047*
South	36	9.45%	H(2) = 12.11,p = 0.002*	
Central	204	53.54%		
Camp	26	6.82%	-	-
City	246	64.57%		
Village	109	28.6%		
Primary	5	1.31%	-	-
High School	7	1.84%		
Tawjihi	29	7.61%		
Diplome	25	6.56%		
Bachelor’s	289	75.85%		
Master’s	22	5.77%		
PhD	4	1.05%		
Divorced	2	0.52%	H(3) = 9.48,p = 0.024*	-
Single	305	80.05%		
Married	70	18.37%		
Widow	4	1.05%		
Pack Years	3.65 ± 13.65	22.57%	-	-
Smoker	86	77.43%		
Non-Smoker	295	5.77%		

Demographic	n	%	Knowledge	Awareness
Recent Smoking Cessation	22			
Alcohol Consumer	51	13.39%	-	-
Never Consumed Alcohol	326	85.56%		
Quit Alcohol	4	1.05%		
Independently mobile	363	95.28%	H(2) = 13.28,p < 0.001*	H(2) = 7.052,p = 0.029*
Bed-Bound	7	1.84%		
Requires Assistance	11	2.89%		
Private Insurance	114	29.92%	-	X2(35) = 10.54, p = 0.015
Public Insurance	166	43.57%		
Uninsured	78	20.47%		
Both	23	6.04%		
Exercises Regularly	81	21.26%	-	X2(2) = 8.15, p = 0.017
Exercises Sometimes	216	56.69%		
Never Exercises	84	22.05%		
Routine Check-ups	107	28.08%	-	-
Family History of Stroke	119	31.23%	H(1) = 4.06,p = 0.044*	-

Table 2
Medical and Medication History and Sources of Knowledge*These correlations are with knowledge/awareness score rather than adequate knowledge/awareness

Medical History and Medications	**n**	**%**	**Knowledge**	**Awareness**
Any Medical History	86	22.57%	-	-
MI	9	2.36%	Dyslipidemia:	-
Dyslipidemia	30	7.87%	H(1) = 4.94,p = 0.026*	
Statins	27	7.09%		
Hypertension	14	3.68%	-	-
Antihypertensive	18	4.72%		
Disarrythmia	16	4.2%	-	-
Antiarrhythmic	17	4.46%		
Diabetes Mellitus	10	2.62%	-	-
Antidiabetic	10	2.62%		
TIA	7	1.84%	TIA:	-
Hypercoagulable	5	1.31%	H(1) = 4.07,p = 0.044	
Liver	4	1.05%		
Anticoagulant	18	4.72%		
Anxiety	26	6.82%	-	-
Depression	18	4.72%		
Anxiolyrics	9	2.36%		
Antidepressant	0	0%		
Malignancy	3	0.79%	-	-
Stroke Knowledge Sources	n	%	-	-
TV	42	11.02%	Doctors:	Doctors:
Youtube	103	27.04%	X2(1) = 13.92,p < 0.001	X2(1) = 4.25,p = 0.039
Religious Lessons	15	3.94%		Socials:
Doctors	150	39.37%	H(1) = 30.48,p < 0.001*	X2(1) = 6.04,p = 0.014
Newspapers	13	3.41%	Internet:	Articles:
Family and Friends	130	34.12%	H(1) = 7.32,p = 0.007*	X2(1) = 9.12,p = 0.003

Medical History and Medications	n	%	Knowledge	Awareness
Internet	227	59.58%	Socials:	H(1) = 26.46,p < 0.001*
Social Media	189	49.61%	H(1) = 6.46,p = 0.011*	
Medical Articles	108	28.35%	Articles:	
Awareness Campaigns	71	18.64%	X2(1) = 46.8,p < 0.001	
Other Sources	72	18.9%	H(1) = 61.26,p < 0.001*	
			Campaigns:	
			X2(1) = 9.68,p = 0.002	
			H(1) = 10.74,p < 0.001*	

Table 3
Knowledge Scale Answers

Questions	Yes (n,%)	No (n,%)	I don't know (n,%)
Stroke is defined as decreased perfusion to the brain	260, 68.24%	21, 5.51%	100, 26.25%
Is stroke a preventable disease?	271, 71.13%	31, 8.14%	79, 20.73%
Can you cure stroke by going to sleep?	11, 2.89%	284, 74.54%	86, 22.57%
Can someone get multiple strokes?	283, 74.28%	16, 4.2%	82, 21.52%
Stroke affects activities of daily living like walking, driving, working	330, 86.61%	12, 3.15%	39, 10.24%
Stroke is a simple disease that does not require treatment	8, 2.1%	349, 91.6%	24, 6.3%
Are the effects of stroke lifelong?	308, 80.84%	19, 4.99%	54, 14.17%
Stroke Symptoms		n	%
Vision		265	69.55%
Headache		241	63.25%
Chest Pain		84	22.05%
Vertigo		221	58%
Ataxia		253	66.4%
Syncope		235	61.68%
Rash		15	3.94%
Aphasia		271	71.13%
Hemiparesis		256	67.19%
Weakness		224	58.79%
Facial Asymmetry		187	49.08%
Dyspnea		126	33.07%
Confusion		195	51.18%
Stroke Risk Factors		n	%
Hypertension		276	72.44%

Questions	Yes (n,%)	No (n,%)	I don’t know (n,%)
Diabetes		166	43.57%
Past History of Stroke		278	72.97%
Aging		229	60.1%
Depression		128	33.6%
Anxiety		201	52.76%
Malnutrition		122	32.02%
Smoking		260	68.24%
Alcohol		211	55.38%
Sports		187	49.08%
Dyslipidemia		183	48.03%
Heart		190	49.87%
Obesity		180	47.24%
Genetic Factors		220	57.74%
Stroke Prevention		n	%
Sports		306	80.31%
Alcohol		246	64.57%
Smoking		290	76.12%
Diabetes		212	55.64%
Infectious		41	10.76%
Diet		233	61.15%
Aspirin		184	48.29%
Vitamins		102	26.77%
HTN		229	60.1%
Water		44	11.55%
Heart		159	41.73%
Statins		167	43.83%
Anxiety		206	54.07%

Questions	Yes (n,%)	No (n,%)	I don't know (n,%)
Depression		78	20.47%
Nothing		25	6.56%

Knowledge and Awareness Predictors

We developed 2 linear regression models, and 2 logistic regression models to assess predictors of knowledge and awareness, as well as their scores. Our knowledge score model was: Knowledge Score ~ STAT Score + Age + Mobility + Doctor Advice + Medical Articles

The overall regression was statistically significant (R2 = 0.308, F(6374) = 27.78, p < 0.001). It was found that STAT score (β = 0.086, p < 0.001), age (β = 0.037, p < 0.001), mobility (Mobile) (β = 2.534, p = 0.002), and relying on doctor advice (β = 1.37, p < 0.001) and medical articles (β = 0.9, p < 0.001) significantly predicted Knowledge score.

Our STAT score model was: STAT Score ~ Knowledge Score + Region + Medical Articles

It was also significant (R2 = 0.166, F(4,376) = 18.76, p < 0.001), with Knowledge score (β = 0.857, p < 0.001), region (South) (β = 2.63, p = 0.027), and medical articles (β = 1.367, p < 0.001) as significant predictors.

Upon holding all other predictors constant, the odds of knowledge would increase by 87.5% (OR: 1.88, 95% CI [1.13, 3.42]) in participants with adequate awareness, would increase by 4.1% (OR: 1.04, 95% CI [1.02, 1.06]) for each year, and would increase by 354% (OR: 4.54, 95% CI [2.76, 4.48]) in those who referred to medical journals. The odds of action awareness would increase by 161% (OR: 2.61, 95% CI [1.55, 4.4]) for knowledge, and would decrease by 77.3% (OR: 0.23, 95% CI [0.08, 0.62]) in private insurance, and by 57.4% (OR: 0.43, 95% CI [0.17, 1.09]) for those with public insurance compared to those with both, while those who depended on social media for action awareness had a 51.1% decrease (OR: 0.49, 95% CI [0.29, 0.83]). Our final model was to predict compound awareness and knowledge. The main predictor was the use of medical articles (OR: 5.72, 95% CI [2.83, 11.57]), while social media decreased this metric by 54.1% (OR: 0.46, 95% CI [0.22, 0.93]), and infrequent exercise decreased it by 59.6% (OR: 0.4, 95% CI [0.17, 0.93]). Consulting doctors had positive trends with a 93.7% increase (OR: 1.94, 95% CI [0.96, 3.89], p = 0.063) Forest plot illustrations of the logistic regression models are shown in Fig. 2.

Discussion

Our study aimed to measure the degree of stroke knowledge and awareness in Palestinian Society, and characterize the knowledge-awareness gap. Our paper highlights a relatively low level of knowledge and action awareness among young Palestinians, but more so a clear discrepancy between the two. This

signifies a particular need to not only inform the population about the illness, but to give exact protocols for the urgency and steps of interventions.

Stroke Knowledge in Palestine & Beyond

There were positive correlations between the age of participants, their range of mobility, and their STAT score, with their knowledge exam score. Greater age yielded a higher knowledge score, possibly due to greater exposure to stroke-related experiences. Mobility, beyond its protective role, may enhance stroke knowledge by facilitating access to healthcare services and increasing social engagement. In regards to the STAT score, an increase in the STAT score significantly predicted an increase in the knowledge exam score, and this proves that the appropriate stroke response strongly depends on individual knowledge.

One Lebanese study conducted multivariate linear regression of the stroke knowledge test (SKT) that showed residence region significantly predicted the SKT score. [6] Though our study identified region as a predictor of awareness, there was no such correlation for knowledge. This indicates that knowledge and awareness, while related, are distinct constructs that require different public health strategies. In contrast to findings from a Lebanese study, which reported higher knowledge among non-smokers, smoking was not assessed in our analysis. [6]

There is compelling evidence that education was a significant factor in the same study, as well as a similar Thai study. As younger adults are assumed to have higher education levels than older adults, younger individuals also had a higher mean SKT score, in the Lebanese study but not in the Thai study and not in our study either, where increasing age was significantly associated with higher knowledge levels. The same study in Thailand showed a correlation with Female gender which they linked to greater social and volunteering involvement seen in Females. This gender distinction in Palestine is nonexistent which explains these differences. [6, 10, 12]

Action Awareness and the Knowledge Gap

In our study, even though 40.68% showed enough knowledge of stroke, only 21% of participants showed enough awareness of stroke action. This difference shows that there is a clinically significant gap between recognizing stroke symptoms and knowing how to respond in an emergency. Because reperfusion therapy is time-sensitive, insufficient awareness of action is a major problem in pre-hospital stroke care.

Regional studies similarly show incomplete emergency response preparedness, despite moderate levels of knowledge. In Iraq, only 18.4% of participants were able to identify all stroke symptoms, which shows that they didn't have a full understanding of them [5]. A Lebanese population-based study using the STAT test indicated a mean STAT score of 41.3%, with merely 36.8% of respondents choosing to activate emergency medical services in response to stroke symptoms in contrast to our 21%. The same study reported that better knowledge predicted better actions of response; despite moderate knowledge levels overall response patterns remained suboptimal. [6]. In the United Arab Emirates, 70.8% of participants

were considered to have good knowledge, but only about 20% were able to correctly identify all of the warning signs and risk factors, and appropriate emergency actions were inconsistently identified among participants although many of them demonstrated strong knowledge about stroke symptoms. [13] This is again an indication that knowledge alone doesn't guarantee appropriate action responses in emergency scenarios. [13]. Sudanese data also showed that 86.3% of people said they would take a suspected stroke patient to the hospital, but only 40.2% of people gave all the right answers, and overall awareness was reported to be suboptimal [14]. A recent study in Saudi Arabia showed that people had different levels of understanding about early stroke symptoms and how to respond, and it found important links between awareness and having chronic disease status. Furthermore, a Lebanese study revealed a significant correlation between proper hospital referral behavior and education and employment [15, 16].

Interestingly, patients with private insurance had lower levels of action awareness when compared to individuals having both public and private insurance. Dual insurance may reflect frequent healthcare exposure and having more complex and remote medical histories, especially in the West Bank context where not all healthcare services are available in private hospitals and vice versa. Repeated exposure to healthcare can lead to more awareness and emergency preparedness. Moreover, individuals with public insurance who demonstrated higher action of awareness than the ones with private insurance probably have more ER visits for milder symptoms as the public insurance in Palestine is much cheaper and has unlimited hospital visits, as opposed to private insurance, which limits interactions with healthcare personnel in Palestine.

The most important finding of this study is the apparent and clinically meaningful gap between stroke knowledge and action awareness. While the two are significantly associated, only 12.07% of the participants demonstrated both adequate knowledge and awareness at the same time. Moreover, a considerable number of participants with sufficient knowledge did not show adequate awareness of the response, and a fraction of participants with insufficient knowledge showed adequate awareness of the action. This pattern suggests that recognition of stroke symptoms does not consistently translate into appropriate behavioral response, a finding that has been reported in previous stroke awareness studies [6, 11].

From a practical perspective, this gap represents a failure to translate cognitive knowledge into behavior. Knowledge represents the ability to recognize stroke symptoms, whereas action awareness is making quick decisions, understanding pathways of healthcare, and having the confidence to take action under pressure in an emergency. This distinction explains why individuals may correctly identify stroke symptoms yet fail to act appropriately in real-life scenarios, a phenomenon highlighted in studies assessing response to stroke symptoms and validated tools such as the Stroke Action Test, which may be influenced by different factors. Basically, identification of emergent situations is more likely to result in better action awareness, irrespective of knowledge. [6, 11]

Our regression analysis supports this interpretation. Adequate knowledge was significantly associated with the likelihood of appropriate action awareness (OR: 2.61, 95% CI [1.55–4.4]), confirming its role as a contributing factor. However, the fact that low awareness levels persist despite this association suggests that knowledge alone is not enough, and other determinants seem to be important, as observed in other population-based studies [5, 12, 14].

Use of structured medical information sources was strongly associated with increased combined knowledge and awareness (OR: 5.72, 95% CI [2.83–11.57]), whereas use of social media was associated with decreased action awareness (OR: 0.49, 95% CI [0.29–0.83]). Differences in stroke awareness according to information sources have been reported previously, supporting the importance of reliable and structured health information [5, 13, 15].

Increased contact with healthcare systems was associated with greater awareness, which may have been due to experiential learning and repeated reinforcement of the right behaviors [5, 16]. We also have additional evidence from observed trends in insurance coverage, which suggests that the frequency and type of healthcare access may affect emergency preparedness. Furthermore, lifestyle factors including physical inactivity were negatively associated with combined knowledge and awareness, indicating that overall health engagement might influence behavioral readiness, in line with broader literature linking lifestyle and stroke risk awareness [3, 4].

The observed knowledge-action gap has important clinical implications. The prognosis of stroke is strongly time-dependent, and any delay in recognizing the need for urgent treatment or in activating EMS directly reduces the eligibility for reperfusion therapies and worsens the prognosis [1, 2, 4]. Accordingly, action awareness is a major barrier to improving stroke outcomes at the population level.

Limitations & Recommendations

The cross-sectional design of our study prevents us from establishing causal relationships. Moreover, the over-representation of younger people and the use of convenience sampling limit the generalizability of the results to the larger population in the West Bank. Data were collected using supervised self-completed questionnaires, which may lead to response and recall bias. Although satisfactory reliability of the assessment tools was observed, the knowledge scale might need further development and validation in different population groups to improve precision and reproducibility in future research.

Our findings show a clear and clinically relevant gap between recognizing stroke symptoms and knowing how to respond in an emergency. This represents a key target for public health intervention. Since most participants reported receiving information through television, the Internet, and social media, these channels offer important avenues to share simple, clear, structured, and actionable health messages. Given the widespread use of digital platforms, improving the accuracy and clarity of health information disseminated through social media and online channels is also essential. Using these platforms to deliver structured, evidence-based messages may help close the gap between knowledge and action. Future awareness campaigns, and Basic Life Support Stroke integration should move beyond symptom

recognition and emphasize the importance of activating emergency medical services without delay. Educational sessions may also be helpful. Future research should evaluate whether these targeted interventions lead to measurable improvements in both knowledge and action awareness, as well as reductions in treatment delays, in line with global stroke awareness priorities [4].

Abbreviations

EMS
Emergency medical services
TIA
Transient Ischemic Attack
STAT
Stroke Action Awareness Test
SKT
Stroke Knowledge Test

Declarations

Consent For Publication:

Not Applicable.

Ethics Approval & Consent to Participate:

This study was conducted in accordance with the declaration of Helsinki, and received ethics approval from the Al-Quds University Ethics Committee, under the identifier: 658/REC/2025. Informed consent for the participation in the study and publication of its findings was taken from all participants prior to data collection.

Declaration of competing interest:

The authors have no competing interests to declare.

Generative AI use:

Generative AI and AI-assisted technologies were NOT used in the preparation of this work.

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Author Contribution

AA, AS, LA, TL, ZA, and PB collected data, wrote the main manuscript, and designed the study. PB conducted statistical analysis and prepared the tables and figures. All authors reviewed the manuscript.

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Data Availability

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

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Figures

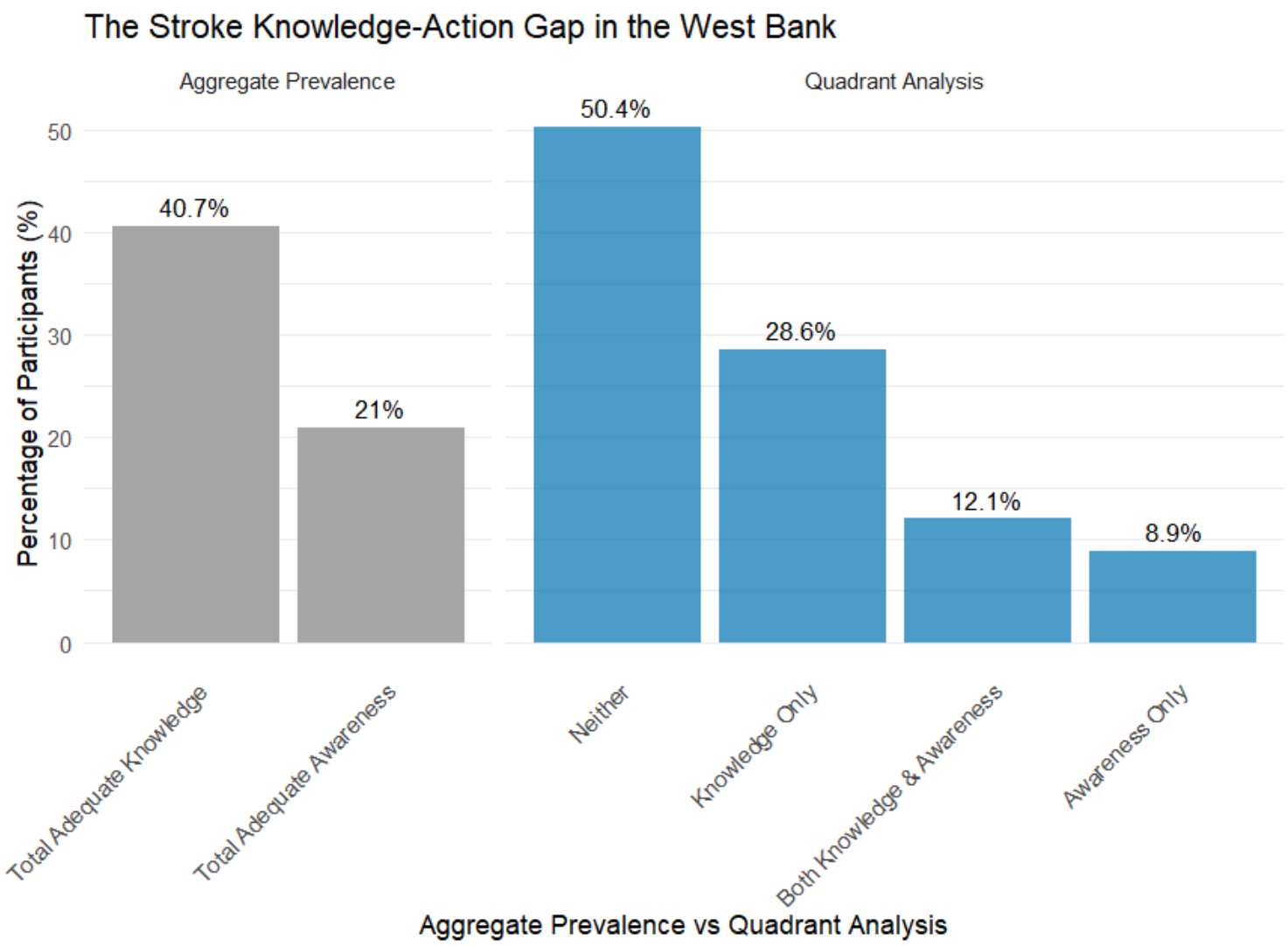
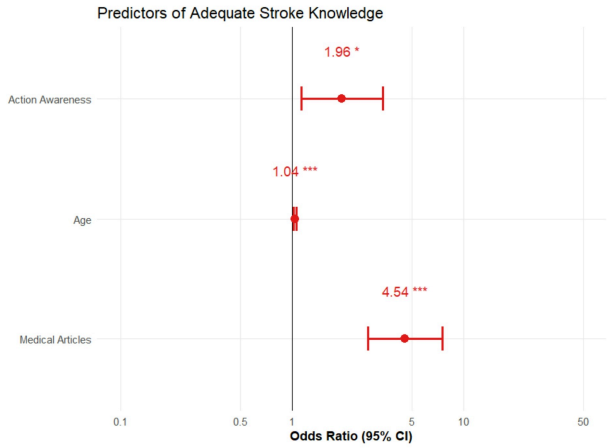
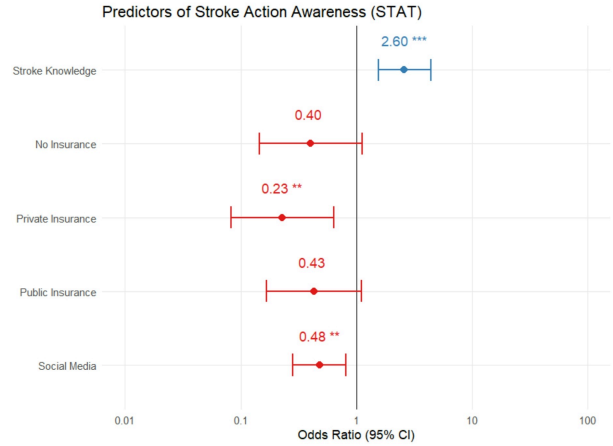


Figure 1

Comparison of Adequate Knowledge and Action Awareness Prevalences





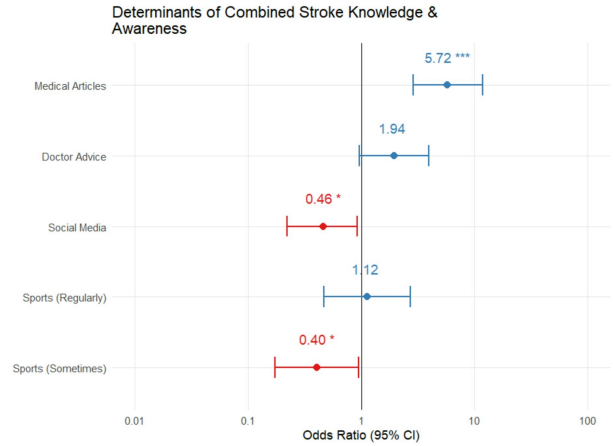


Figure 2

2.a. Forest Plot of Predictors of Stroke Knowledge 2.b. Forest Plot of Predictors of Stroke Action Awareness 2.c Forest Plot of Predictors of Compound Adequate Knowledge and Adequate Awareness