

Utilisation Of AYUSH Systems Of Medicine Among 15- To 59-Year-Old Age Group In North-East India: A Generalised Structural Equation Model

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Abstract

Background: Health is acknowledged as a foundational component of human development and healthcare systems perform a significant role in improvement and retain of mental and physical health. In present times, global health policy of the WHO has acknowledged the salience of traditional, complementary and alternative medicine (TCAM) in fulfilling universal health coverage, specifically under Sustainable Development Goal 3 (SDG 3). In India's healthcare framework, TCAM is systematised as AYUSH, which is firmly entrenched within the Indian Knowledge Systems (IKS). Despite a rich legacy of folk medicine, home remedies, and sociocultural history in North-East India, empirical work on the utilisation of AYUSH systems of medicine in this region is limited. Objective: This study aims to find the utilisation pattern of AYUSH healthcare systems in North-East India by using Andersen's Behavioural Model of Health Services Utilisation. Methods: for this study, the National Sample Survey (NSS) 79th round data set was used, and generalised structural equation modelling (GSEM) with a logit link of the Bernoulli family was applied, and a Receiver Operating Characteristic (ROC) was done for model predictive accuracy. Results: under the predisposing factors, individuals aged 45-59 years (Odd Ratio "OR" = 3.545113, 95%CI:3.154900-3.983589) exhibited higher odds. Female respondents utilise more AYUSH compared to males. Knowledge of folk medicine (OR= 1.330267, 95%CI:1.170130-1.512321), home remedies, medicinal plants and perceived belief of this healthcare system showed a significant predictor of AYUSH utilisation. Under the enabling factors, individuals from the lower-educated group and the higher economic group showed higher odds. Conclusion: utilisation of the AYUSH system of medicine in North-East India is sufficiently framed by Andersen's predisposing and enabling factors. This study furnishes some policy measures to enhance the utilisation of AYUSH healthcare in this region.

Keywords: *Utilisation of AYUSH, Andersen Behaviour Model, Generalised Structural Equation Modelling, NSS, North-East India.*

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I. Introduction:

Globally, health is acknowledged as one of the founding stones of human development. To improve and retain individuals' mental and physical state, the sum total of professional and systematic medical services is widely referred to as a healthcare system (Faulkner and Nicholson, 2020). Different types of healthcare systems are present in health field. In the past century, Western biomedical systems of healthcare called allopathy emerged as one of the key domains in healthcare systems. Globally, healthcare systems are undergoing in rapid transformation. Under the United Nations' Sustainable Development Goal (SDG), basically in SDG 3, aimed "to ensure healthy lives and promote well-being for all at all ages" (Martin, 2020 ; "WHO_EDM_TRM_2000.1,"). Under the purview of universal health coverage, different types of healthcare systems came into the mainstream. In global health policy, traditional, complementary, and alternative medicine (TCAM) creates a new horizon in the healthcare field. The World Health Organisation (WHO) states TCAM as "the sum of skills, knowledge and practices based on the beliefs, theories, and experiences indigenous to different cultures, applied in the sustaining of health and in the treatment of ailments and for diagnosis". Acknowledging the significance of importance of TCAM, WHO framed "Traditional Medicine Strategy 2014-2023" and recently in 2025, it entails for evidence-centric incorporation of TCAM in to the formal healthcare

system to accessibility, enhance quality and safety(Traditional, Complementary and Integrative Medicine,2025). In the Indian pluralistic landscape of the healthcare field, TCAM is one of the important things. TCAM in India is mainly coined as AYUSH (Ayurveda, Yoga, Naturopathy, Unani, Siddha, Sowa-Rigpa and Homoeopathy). AYUSH are strongly incorporated within the larger framework of Indian Knowledge Systems (IKS). Ayurveda, Yoga, and Siddha come under the major Indian traditional medicines. For the mainstreaming of the AYUSH system of medicine in India's formal health governance, a dedicated AYUSH ministry has been established. Utilisation of healthcare mainly aims to mitigate health problems, use of health services to manage health, undergo diagnosis and receive treatment for ailments. AYUSH covers both preventive and curative perspectives in healthcare utilisation. Utilisation of the healthcare system is mainly catered by socioeconomic status, availability of healthcare services (Peters *et al.*, 2002), sociocultural beliefs or behaviour (Goddard and Smith, 2001). Andersen's Behavioural Model of Health Services gave a widely recognised theoretical framework(Alkhawaldeh *et al.*, 2023). This model articulates predisposing, enabling and need factors that are responsible for the function of healthcare utilisation. Regionally, India is stratified into six regional parts like northern, eastern, western, central, southern and northern parts. Across the six regions, the North-eastern part has a unique sociocultural tradition, socioeconomic status, legacy of folk medicine and home remedies practices, etc. Despite these, very little empirical work is done in the field of utilisation of AYUSH healthcare systems in this region based on Andersen's Behavioural Model. The objective of this study is to examine the utilisation pattern of AYUSH healthcare services in North-East India using Andersen's Behavioural Model of health services.

II. Methods:

Data Source- For this work, data were taken from the National Sample Survey (NSS) 79th round, 2022-2023 on AYUSH, an all-India basis household survey conducted by the Ministry of Statistics and Programme Implementation (MoSPI) under the Government of India(India - AYUSH of NSS 79th round: 2022-23). Under this pan-India survey, there are two data files at the household and individual levels, respectively. The work involves merging the former with the latter to incorporate household-level characteristics in the analysis of individual-level data. This incorporated file contains 30484450 individuals or observations (after applying the weight = 'Multiplier/100') in North-East India, which consists of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim. For this particular study, the sample was bound with individuals aged 15 to 59 years, excluding children and senior citizens. For this study, Andersen's Behavioural Model of Healthcare utilisation was used. From the data set, "Whether used AYUSH system of medicine in the last 365 days" is treated as the dependent variable ~ Utilisation, and it is measured as a binary outcome (Used =1 and Otherwise=0). For this binary nature of the dependent variable, general structural equation modelling (GSEM) is used. In this GSEM, the logit link was used with the Bernoulli family. Fig 1: Theoretical model of study-based Andersen's behavioural model of AYUSH utilisation in North-East India. In this model, only the direct effect of predisposing and enabling factors on AYUSH utilisation is incorporated. For this study, Receiver Operating Characteristic (ROC) analysis was used to exhibit the model's predictive accuracy. All analyses were done in STATA software, version 14.

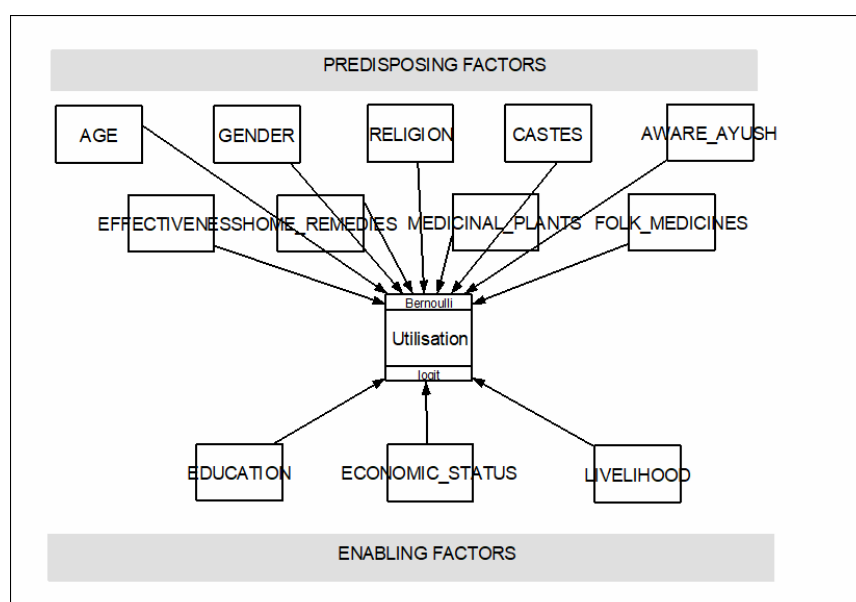


Fig:1 Theoretical model of study-based Andersen's Behavioural Model of AYUSH utilisation in North-East India.

Table:1 Descriptive Analysis			
Background Characteristics		Category	Weighted Frequency (%)
PREDISPOSING FACTORS	Age	15-29 years	12655135 (41.52)
		30-44 years	10782848 (35.37)
		45-59 years	7046467 (23.11)
	Gender	Female	15104101 (49.56)
		Male	15380349 (50.44)
	Religion	Hindu	16424225 (53.88)
		Muslim	7278881 (23.88)
		Others	6781344 (22.24)
	Cast	Others	18340631 (60.16)
		SC/ST	12143819 (39.84)
	Knowledge of Home Remedies	No	12465689 (40.89)
		Yes	18018761 (59.11)
	Knowledge of Folk Medicines	No	26463656 (86.81)
		Yes	4020794 (13.19)
	Knowledge of Medicinal Plants	No	14664767 (48.11)
		Yes	15819683 (51.89)
	Awareness of AYUSH	Aware	28615838 (93.85)
		Not aware	1868612 (6.15)
	Perceived Effectiveness of AYUSH	Not effective	10426672 (34.20)
		Effective	20057778 (65.80)
ENABLING FACTORS	Education	Lower educated	16468460 (54.03)
		Higher educated	14015990 (45.97)
	Economic Status	Higher Economic Status	3930846 (12.88)
		Lower Economic Status	26553604 (87.12)
	Livelihood	Self-employed	13887127 (45.56)
		Others	16597323 (54.44)

(Source: Authors calculation from the NSS79th round data on AYUSH)

Table 1 represents descriptive analysis of the model of AYUSH healthcare utilisation in North-East India, classified into predisposing and enabling factors as per the Andersen Behavioural Model(Xu *et al.*, 2021). Under the Andersen Behavioural Model, Predisposing factors contain demographic, cognitive knowledge on health beliefs, social characteristics, etc(Soleimanvandiazar *et al.*, 2024). In this study, age, gender(Ray *et al.*, 2018), religion, cast(Chatterjee *et al.*, 2023), knowledge of folk medicines, knowledge of medicinal plants, knowledge of home remedies, awareness of AYUSH medicines and effectiveness of this medicine are taken into consideration(Adongo and Asaarik,2018). Around 42 per cent of AYUSH users were between 15 to 29 years age group, while the older adult age group between 45 to 59 years was 23 per cent. The gender distribution was nearly balanced between males and females. In terms of religion, a large number of respondents were from Hinduism, followed by Muslims and other religious groups like Christianity, Sikhism, Jainism, Buddhism, Zoroastrianism, etc. Social casts group-wise distribution exhibits that other caste groups like general/unreserved and other backward class (OBC) accrue a larger portion of the population than the Scheduled Castes (SC) and the Scheduled Tribes (ST). With respect to home remedies, 59.11 per cent of the population have knowledge of them. Whereas, knowledge of folk medicines has 13.19 per cent of people, and knowledge of medicinal plants is evenly distributed among people. Out of the total population, 93.85 per cent of people are aware of AYUSH systems. 65.80 per cent of people believe that AYUSH systems are effective. Under the enabling factors, taken education(Thakur *et al.*, 2019), economic status(Banerjee and Roy Chowdhury, 2020), and livelihood. 54.03% of people belonged to the lower education category. Economic status was derived from the usual monthly household consumer expenditure. Lower and higher economic status groups were created on the basis of the median. The higher economic status group is distributed among 12.88 per cent of people. With respect to livelihood, 45.56 per cent of people were self-employed, while 54.44 per cent of people were associated with regular wage earners or casual workers.

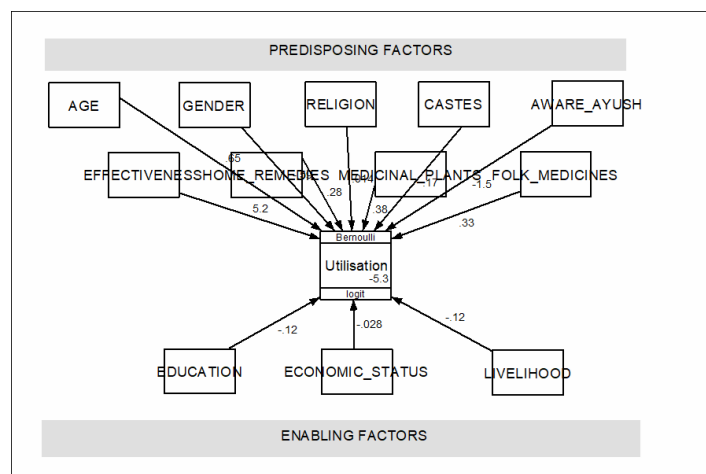


Fig. 2 Estimation of the theoretical model of the study-based Andersen's behavioural model of AYUSH utilisation in North-East India.

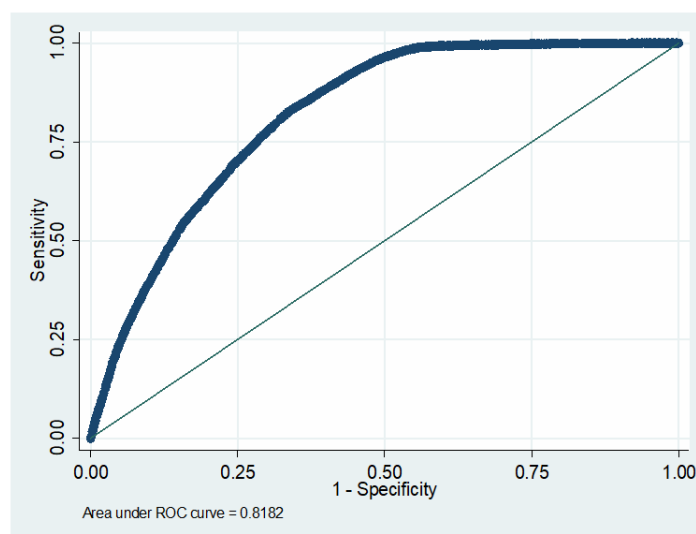


Fig:3 Area under ROC curve = 0.8182

The predictive performance of GSEM is examined by the “Receiver Operating Characteristic (ROC) curve”. Area under the curve came to 0.8182. This result shows that the model significantly distinguishes between those who utilised AYUSH healthcare systems and those who did not utilise them in North-East India. Result between 0.80 and 0.90 exhibits efficient model performance. It suggests that predisposing and enabling factors have good explanatory power for this model for AYUSH healthcare utilisation in North-East India.

Table:2(a)							
Background Characteristics		Coef.	Conf. Interval		Odd Ratio	Conf. Interval	
PREDISPOSING FACTORS	Age	0.6481083	0.5911607	0.7050560	1.911921***	1.806084	2.02396
	Gender	-0.5861052	-0.6706438	0.5015666	0.556905***	0.5113792	0.6055812
	Religion	0.0139367	-0.0377924	0.0656658	1.014034	0.9629128	1.06787
	Castes	0.1695278	0.0758933	0.2631623	1.184745***	1.078847	1.301038
	Knowledge of Home Remedies	0.2784717	0.1504268	0.4065166	1.321109***	1.16233	1.501578
	Knowledge of Folk Medicines	0.3285223	0.2251164	0.4319281	1.388914***	1.252468	1.540224
	Knowledge of Medicinal Plants	0.3831023	0.2708323	0.4953724	1.466828***	1.311055	1.641109
	Awareness of AYUSH	-1.519315	-1.803699	-1.234931	0.2188617***	0.1646886	0.2908548
	Perceived Effectiveness of AYUSH	5.193589	4.931949	5.455230	180.1139***	138.6495	233.9786

Education	-0.122723 8	-0.210543 5	-0.034904	0.884508**	0.8101438	0.9656981
Economic Status	-0.027616 4	-0.145849 1	0.0906162	0.9727614	0.8642881	1.094849
Livelihood	- 0.1180949	-0.203240 4	- 0.0329493	0.8886117***	0.816082	0.9675876

GSEM: Coefficient beta -0.0276164, SE: 0.0603239, z value: -0.4578023, p value: 0.06470945, log pseudolikelihood=-13010705, CI-LB: -0.1458491 CI-UB: -0.0906162, *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.10$ (Source: Authors calculation from the NSS79th round data on AYUSH)

Table:2(b)		
Background Characteristics		Odds Ratio
PREDISPOSING FACTORS	Age	15-29 years (Ref)
		1.000000
		30-44 years
		1.964792(1.786384-2.161017) ***
		45-59 years
		3.545113(3.154900-3.983589) ***
	Gender	Female (Ref)
		1.000000
		Male
		0.5574063(0.5121731-0.6066342)***
	Religion	Hindu (Ref)
		1.000000
		Muslim
		0.8560574(0.7617841-0.9619972)***
		Others
		1.144725 (1.022178-1.281963) ***
	Cast	Others (Ref)
		1.000000
		SC/ST
		1.048147(0.9282956-1.183471)
ENABLING FACTORS	Knowledge of Home Remedies	No (Ref)
		1.000000
		Yes
		1.330267(1.170130-1.512321) ***
	Knowledge of Folk Medicines	No (Ref)
		1.000000
		Yes
		1.382183(1.246289-1.532896) ***
	Knowledge of Medicinal Plants	No (Ref)
		1.000000
		Yes
		1.475103(1.317707-1.651300) ***
	Awareness of AYUSH	Aware (Ref)
		1.000000
		Not aware
		0.2149272(0.1614713-0.286080) ***
	Perceived Effectiveness of AYUSH	Not effective (Ref)
		1.000000
		Effective
		180.7695(139.1209-234.8863) ***
	Education	Lower educated (Ref)
		1.000000
		Higher educated
		0.8616682(0.7884416-0.9416957)***
	Economic Status	Higher Economic Status (Ref)
		1.000000
		Lower Economic Status
		0.9492686(0.842380-1.069720)
	Livelihood	Self-employed (Ref)
		1.000000
		Others
		0.8958304(0.8227535-0.9753979) **

Note: Ref-Reference category; *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.10$

In this generalised structural equation model (GSEM) exhibited, the dependent variable is taken as "whether any of the AYUSH systems was used in the last 365 days" ~ Utilisation. Under the predisposing factors, age appeared as a significant factor of AYUSH utilisation in North-East India. Juxtaposed with individuals aged 15-29 years (reference category), individuals aged between 30-44 years and 45-59 years utilised AYUSH systems of medicine nearly twice and thrice, respectively. This significantly strong association between utilisation of AYUSH systems of medicine and age focus a clear age-life-course trajectory. It may be because AYUSH systems of medicine are more suitable for chronic or lifestyle-related ailments in long-term holistic treatment. Moreover, an aged individual has a strong belief in traditional, complementary and alternative medicines through family trust and personal beliefs. In north-east India, female individuals utilise more AYUSH system of medicine in comparison with males (Odd Ratio ~ OR=0.5574063,95% CI:0.5121731-0.6066342). In north-east India, women make an important contribution to household health management. Higher utilisation of the AYUSH system of medicine among females may give insights into how they use it for holistic and precautionary perspectives in female-specific ailments. Individuals who belong to other religions (OR=1.144725,95% CI=1.022178-1.281963), such as Christianity, Jainism, Buddhism, Sikhism, etc, utilise more AYUSH systems of medicine compared to the reference category, Hinduism. It clearly supports that the utilisation of AYUSH medicine has a significant religious belief. Social casts groups, like scheduled tribes (ST) or scheduled caste (SC) groups, individuals utilise more AYUSH systems of medicine compared to other social casts groups. This result significantly points out that utilisation of AYUSH medicine strongly correlated with sociocultural beliefs among SC and ST people in north-east India. In this generalised structural equation model, knowledge-based factors exhibited consistently significant associations. Those who have knowledge about home remedies (OR=1.330267,95%CI=1.170130-1.512321), how it works as a part of AYUSH healthcare utilisation, utilised more AYUSH systems of medicine compared with those who have no knowledge. Similar knowledge-centric results showed in the case of folk medicines (OR=1.382183,95%CI=1.246289-1.532896) and medicinal plants (OR=1.475103,95%CI=1.317707-1.651300). This knowledge-centric result significantly

proved the Andersen's Behavioural Model of healthcare utilisation. Awareness of AYUSH systems of medicine is one of the key predisposing factors. It creates a strong association between the utilisation of these kinds of medicine and awareness of this kind of medicine. Respondents who believe in the effectiveness of this system of medicine are utilising significantly higher odds, nearly 180 times, compared to those who believe it is ineffective. It indicates that not only are affordability and accessibility important for AYUSH utilisation, but also belief in this system of medicine is an important factor in north-east India. Under the enabling factors, for this study, the factors were only education, economic status and livelihood. Individuals who are higher educated ($OR=0.8616682, 95\%CI=0.7884416-0.9416957$) utilised less AYUSH healthcare. Higher educated people may prefer other types of biomedical medicine for their ailments or better accessibility to other biomedical facilities and trust. Individuals who are from higher economic strata utilise more AYUSH system of medicine compared to the reference group. According to the means of livelihood variables, individuals from other types of livelihoods ($OR=0.8958304, 95\%CI=0.8227535-0.9753979$), like casual labourers, regular wage earners, utilised less AYUSH system of medicine than reference group. This may be because of time constraints, different healthcare coverage in the workplace or easy access to other biomedical treatment.

III. Conclusion:

This work exhibits significant evidence on the determinants of AYUSH healthcare utilisation in this region, applying GSEM based on Andersen's Behavioural Model. It is structured by predisposing and enabling factors embedded in socio-demographic factors, beliefs, and knowledge. Older adults and females showed a higher utilisation rate compared to their counterparts. The concerned authority may look into this matter. Social caste status and religious affiliation exhibited significant associations with AYUSH utilisation. Awareness of this system and knowledge of folk medicines, home remedies, and medicinal plants intensify the likelihood of AYUSH utilisation in North-East India. Especially, belief in the effectiveness of this system of healthcare increases the likelihood notably. This affirms the main proposition of Andersen's Behavioural Model that attitudinal and cognitive variables significantly affect AYUSH healthcare utilisation in North-East India. Under the enabling factors, respondents from higher economic strata exhibit greater reliance on AYUSH utilisation. Respondents from the lower education group also utilise more AYUSH healthcare. Overall, studies affirm that AYUSH utilisation in North-East India is primarily driven by sociocultural beliefs, socioeconomic factors and AYUSH-related knowledge. From a policy-oriented view, concerned authorities may focus on evidence-based communication on awareness enhancement programmes and arrange more community-based "AYUSH healthcare effectiveness" like programmes. The mentioned policy may support the mainstreaming of AYUSH aligned with universal health coverage (UHC) and SDG 3.

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