Health outcome measures and determinants of using indigenous medicine in a pluralistic healthcare in Nagaland, Northeast India

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ABSTRACT

Introduction: Traditional medicines have been used for different ailments in the dominant modern healthcare, and also as a complement to it. Though it serves as an important healthcare services but is often underestimated. Therefore, the potential contribution of traditional medicine in healthcare needs to be explored, harnessed and promoted.

Objectives: First, this paper attempts to assess users' outcome measures of EuroQol 5 Dimension of traditional medicine using paretian classification of health change. Second, to analyze the determinants and inter-dependence of disease and type of healthcare.

Methods: Primary data was collected from Dimapur district, Nagaland during March–July 2014 from 540 households and statistical techniques like Bivariate probit analysis was used.

Results: Paretian classification of health change found 27% of the respondents has 'improved' their health status after using traditional medicine, but 45% had also 'mix change' in health status. Bivariate probit analysis shows significant result among older age groups that are more likely to suffer from non-communicable diseases. The longer the duration of disease, the more likely to use traditional medicine and for non-communicable diseases the probability of using traditional medicine was higher as compared to allopathic medicine.

Conclusion: Demand for traditional medicine is evident and it does contribute in providing healthcare. Thus, from the stakeholders, efforts for proper conservation, validation and documentation is necessary for promotion and development of indigenous medicine. Hence reducing the burden of healthcare expenditure among the communities and also sustain the rich cultural practices of traditional medicine.

1. Introduction

A Patient's decision making in healthcare is complex but important for health economist and health policy makers. In healthcare decision making, exploring phase is crucial for the acceptance of a disease, and the decision of an individual is more on emotions rather than rational when culture is considered.¹ In every society all cultures have system of beliefs to explain what causes a disease, thereby influencing a patient to take decision on seeking healthcare services. Different communities, have different beliefs of what 'sick' means, mostly it has been interpreted as either caused by some supernatural or because of lifestyle. Culture does play a dominant role in demanding the type of healthcare. Therefore acceptability of any healthcare depends on the culture or belief system of the society. Often, health professionals seeking to enhance the safety and quality of health services identify culture as a barrier to change. A study found that enduring change in healthcare requires a change in culture but by professional values that can be redirected to support the change.²

In any society etiology about the disease and also culture are crucial in demanding traditional health care, basically there are two types of traditional health care practice: the **first** is categorized as the faith healers or folk practitioners, the **second** category is AYUSH.³ Therefore, accessing or demanding for healthcare is determined by many factors such as credibility, cultural identities, individual health status and understanding of the disease.⁴ Beliefs on supernatural such as bad luck, reverse bad luck, magic, poisoning and ancestral problems also determine in accessing traditional healthcare.⁵ Often, traditional and biomedical system that exists, complements each other, though biomedical was preferred but traditional medicine was consulted when biomedical failed. Thus, social acceptability of biomedical care is important in accessing healthcare services.^{6,7}

In health surveys, standardized health status measurement tools were used in order to understand the existing health status not only to inform the policy makers but also to assess the medical interventions and health programs. EuroQol-5 Dimension (EQ-5D) is a generic measurement tool for self-reported health status that was developed by a

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research group established in 1987. It is now widely used in different countries by clinical researchers in a variety of clinical areas. The EQ-5D dimensions seem capable of capturing the consequences of diabetes-related complications⁸ and can be used to estimate quality-adjusted life-years in cost-effective analyses.⁹ Thus EQ-5D gives a summary of overall health which is closer to users perspective.¹⁰

Northeast India, which comprises of eight smaller states, the use of age-old traditional healing systems like folk medicine that is indigenous to the region is prevalent. Due to its high demand, the National Rural Health Mission (NRHM) emphasized on the concept of mainstreaming AYUSH and revitalization of local health tradition at various rural health facilities such as community health centers and primary health centers. Consequently, in Mon district, Nagaland, the traditional bone-setters have been included in NRHM to overcome acute lack of doctors in Nagaland.¹¹ In Northeast India, the medicinal plants which folk healers use for treatment of diseases was found to have significant healing power either in their natural state or as the source of new products processed by them.¹² Due to the cultural affinity and beliefs with the interaction of ecological environment, indigenous knowledge about the use of herbs and vertebrate has the advantage in curing certain diseases. Among the Ao tribe of Nagaland use of vertebrate derived medicine was used for a whole range of afflictions like body pain, rheumatism, asthma, liver disease, etc.¹³ The decision to go to traditional healers is influenced by the disease symptoms which differentiate between going to a hospital or to traditional healers.⁶

Thus, demand for traditional medicine is evident from previous research, so based on that, there are few research questions, which the present study seeks to understand.

1. In a region where there is availability of modern healthcare services, what role does traditional practitioner play in delivering healthcare services?
2. Whether there is any improvement in health status after using traditional medicine?

Based on the above research question, the objective of the study is: First, it attempts to assess users' outcome measures of Euroqol 5 Dimension of traditional medicine using paretian classification of health change. Second, to analyze the determinants and interdependence of disease and type of healthcare.

2. Data and methods

Nagaland is a small state in Northeast India dominated by the Naga tribes, consisting of 11 districts with a population of 1,978,502 and a total area of 16,579 sq. km as per India Census 2011. The state has as many as 16 different ethnic groups that have their own separate identities, customs, dresses and languages.

The study used primary data collected from Dimapur district, Nagaland during March–July 2014 from four different tribes namely Ao, Sumi, Angami and Lotha. Selection of sample from these tribes was done on the dominance of the four tribes in the district. For the data collection, Dimapur district was selected purposively as this district comprised of maximum health care services.¹⁴ In Nagaland, this district comprises of heterogeneous population with the majority comprising of Naga tribes from all over Nagaland and also from other states. Therefore the study was done in a setting that consists of diverse tribes in which the target respondents (both clients and providers) were abundantly concentrated. A stratified random sampling technique was applied to select the households. The populations was subdivided into strata for each tribe, after which randomly ten villages were identified from the strata. Finally, selections of households were done from the selected villages according to population proportionate to size (PPS). For sample size calculation, Concurrent Evaluation-National Rural Health Mission (CE-NRHM) survey on the prevalence of use of traditional health care providers by households was taken. Therefore, 540

households were selected out of which 382 respondents were eligible to be interviewed who had availed treatment (health care) for any illness in the last 15 days (communicable disease) or in the last one month (non-communicable disease), in case if a household had more than one member who had availed treatment, only the information for the last treatment was collected.

EuroQol 5 Dimension (EQ-5D) EQ-5D is a standardized measure of health status developed by EuroQol Group.¹⁵ Applicable to a wide range of health conditions and treatments. It provides a simple descriptive profile and a single index value for health status that can be used in the clinical and economic evaluation of health care as well as in population health surveys. In this study EQ-5D and The Euroqol Visual Analogue Scale (EQ-VAS) was used to measure health status¹⁵ after the respondents had used traditional medicine, which is based on self-rated health status.

The EQ-5D questionnaire comprises of 5 dimensions on Mobility, self-care, usual activity, pain/discomfort and anxiety/depression. Each of the 5 dimensions is divided into 3 levels of perceived problems: Level 1: indicating no problem; Level 2: indicating some problems; Level 3: indicating extreme problems. The Euroqol Visual Analogue Scale (EQ-VAS) records the respondent's self-rated health where the endpoints are labeled as 'Best imaginable health state' and 'Worst imaginable health state'.

2.1. Paretian Classification of Health Change (PCHC)

The information collected from EQ-5D and EQ-VAS could not provide overall health improvement within an individual, so in order to provide a summarize analysis of EQ-5D into a single score, Paretian Classification of Health Change (PCHC) has been used. Here, the PCHC concept is adopted from other studies¹⁶ to understand the overall health status among the individuals and compare the relative importance of changes in different dimensions of health. This is analogous to the principle of pareto improvement in welfare economics. From the EQ-5D, a health state is deemed to be 'better' than another if it is better on at least one dimension, and is no worse in any other dimension. EQ-5D health state is deemed to be 'worse' than another if it is worse in at least one dimension, and is no better in any other dimension. Using that principle to compare a patient's EQ-5D health states between any two time periods, there are only 4 possibilities¹⁶:

1. The health state is better;
2. The health state is worse;
3. The health state is exactly the same;
4. The changes in health are 'mixed': better on one dimension, but worse on another.

2.2. Bivariate Probit model

This model deals with two separate binary dependent variables and the relatedness between outcomes in the form of correlation of the error terms of the binary outcomes model. The correlation between the error terms of the two equations recognizes that there may be unobservable characteristics of individuals that influence the two separate binary dependent variables. The variables used in the model are:

Dependent variable

Disease: '0' Communicable diseases & other diseases (CDs & other diseases) and '1' Non -communicable diseases (NCDs). Here for analysis purpose the communicable diseases & other diseases (other diseases include diseases such as 'other condition/disability' and 'others' as given in Table 1) were combined together and coded as '0' while non-communicable diseases was coded as '1'.

The classification of disease was done on the basis of earlier study which had used NSSO data and classified the disease based on ICD-9.¹⁷ The diseases which were reported by the respondents during the interview but were not listed in the interview schedule under the

classification of diseases they were categorized as 'Others'.

Type of healthcare: '0' Allopathic medicine '1' Traditional medicine.

Independent variable

Sex: 1) Male, 2) Female.

Age: 1) < 15, 2) 15–25, 3) 26–39, 4) 40–59, 5) 60 +

Education: 1) No formal schooling, 2) Middle school, 3) High school, 4) Secondary and above.

Healthcare expenditure: 1) Low (Rs. 0–1000), 2) Average (Rs. 1001–5000), 3) High (Rs. 5001–10000), 4) Very High (Rs. 10001–600000). (The categorization of healthcare expenditure is done on the basis of amount spent. In the category of 'low' health expenditure, the lowest is '0' as some of the respondents who availed traditional medicine did not pay user fee and some paid in kind)

Wealth index: 1) Poorest, 2) Poorer, 3) Middle, 4) Richer, 5) Richest. (The wealth index variable was created using Principal Component Analysis)

Duration of sickness: 1) Less than 3 months, 2) one year to three years, 3) More than 3 years.

EQ-VAS: 1) Lowest health status, 2) Poorer health status, 3) Average health status, 4) Higher health status, 5) Highest health status. (The EQ-VAS categorization is done on the basis of EQ-VAS scale)

Tribe: 1) Ao, 2) Angami, 3)Sema, 4) Lotha.

The entire analysis is carried out in Stata.12 version.

Note: In the whole analysis traditional medicine (TM) is used synonym with traditional care/practitioner/indigenous medicine and vice-versa; Modern care is also used synonym with allopathic medicine and vice-versa.

3. Results

3.1. Profile of the respondents

Table 1 shows the respondents background characteristics. Among the respondents, majority of them belonged to the age group of 40–59 years followed by 26–39 years. The shares of age below 15 years were 16% and age 60+ were around 17% respectively. The female respondents were slightly more compared with male counterparts. By educational qualification, 5.5% had no formal schooling and around 20% had secondary education or above. Here, the type of healthcare facility is for the last treatment taken, and it was found that around 19% of them availed public healthcare, 49% private and 32% availed traditional medicine. Among the respondents, those suffering from non-communicable diseases (NCDs) dominated compared with communicable diseases (CDs) and also 'Others' disease. It was also found out that 47% of them were suffering from the disease for less than three months, while 35% of them were suffering from the disease for more than 3 years. EQ-VAS shows that almost 70% of them had good health, 24% average health status and around 6% responded low health status.

By household characteristics nearly half of the respondents were living in *pucca* house and 36% of them were living in *kuccha* house. By occupation of head of the household about 70% were either in private/government jobs and about 18% were self-employed, while about 13% were engaged in farming. 28% of the families had Below Poverty Line (BPL) card and there is almost equal representation of the four tribes in the study population. It is also evident about the household healthcare expenditure, as it was found that 28% of the respondents who availed treatment their healthcare expenditure was very high while around 31.4% of the respondents their health expenditure was low.

From Fig. 1, it shows the percentage distribution of type of traditional practitioner/medicine used by the respondents and it was found that more than half of them had visited osteopathy/bone-setter (52%) followed by naturopathy (40%). It was also evident that spiritual healing is also used, as 7% of the respondents had availed faith healer for their disease.

Table 1

Percentage distribution of background characteristics among the study population, Dimapur 2014.

Respondents characteristics		
Age	n	%
< 15	61	16
15–25	43	11.3
26–39	87	22.8
40–59	128	33.5
60 +	63	16.5
Sex		
Male	176	46.1
Female	206	53.9
Education		
No formal schooling	21	5.5
Middle	122	31.9
High school	138	36
Secondary and above	75	19.6
NA ^a	26	7.1
Type of healthcare		
Public	71	18.6
Private	188	49.2
Traditional	123	32.2
Disease		
Communicable	126	32.9
Non-communicable	134	35
Other condition/disability	46	12
Others	76	19.9
Duration of sickness		
Less than 3 months	180	47.1
One to three years	68	17.8
More than 3 years	134	35.1
EQ-VAS		
Lowest health status	3	0.8
Poorer health status	17	4.5
Average health status	93	24.4
Higher health status	141	36.9
Highest health status	128	33.5
Household characteristics		
Type of house		
kuccha	139	36.4
Pucca	188	49.2
Semi pucca	55	14.4
Occupation of head of household		
Farmer	48	12.6
Self employed	68	17.8
Salaried (Both private and Government job)	266	69.6
BPL card		
Yes	108	28.3
No	274	71.7
Wealth index		
Poorest	108	20.0
Poorer	113	20.9
Middle	103	19.1
Richer	108	20.0
Richest	108	20.0
Healthcare expenditure		
Low	120	31.4
Average	111	29.1
High	44	11.5
Very High	107	28.0
Tribe		
Ao	101	26.4
Angami	97	25.4
Sema	91	23.8
Lotha	93	24.4

Note: Other condition/disability include- Eye ailments (cataract, glaucoma, conjunctivitis), diseases of the mouth, teeth and gum, other undiagnosed ailments.

'Others' include health problem such as-intestinal, piles, appendix, liver, Ureteral obstruction, synes, spinal arteriovenous malformation (AVM), swelling of legs, nerve, food poisoning, chest problem, sterilization, lung infection, ringworm, sprain of legs, infertility, breathing problem, weakness, stomach problem.

^a Age less than 6 years.

Fig. 1. Percentage of type of traditional practitioner/medicine availed by the respondents, Dimapur 2014.

Table 2

Percentage change in overall health status using EQ-5D among the users of traditional medicine by diseases according to Paretian Classification of Health Change, Dimapur 2014.

	CDs	NCDs	Others*	Total
No change	26.5 (13)	42.7 (21)	30.6 (15)	27.7 (49)
Improve	27.1 (13)	54.2 (26)	18.8 (9)	27.1 (48)
Worse	0.0	100 (1)	0.0	0.56 (1)
Mix change	32.9 (26)	39.2 (31)	27.9 (22)	44.6 (79)
Total	29.4 (52)	44.6 (76)	25.9 (46)	100 (177)

Note: CDs-communicable diseases; NCDs- Non-communicable diseases.

* -intestinal, piles, appendix, liver, Ureteral obstruction, synes, spinal arteriovenous malformation (AVM), swelling of legs, nerve, food poisoning, chest problem, sterilization, lung infection, ringworm, sprain of legs, infertility, breathing problem, weakness, stomach problem, eye ailments (cataract, glaucoma, conjunctivitis), diseases of the mouth, teeth and gum, other undiagnosed ailments. Figures in parentheses indicate the sample size.

3.2. Paretian classification of health change (PCHC)

In Table 2 the analysis is carried out among users of traditional medicine who had availed traditional medicine at least once. It is evident from the Table 2 that around 28% had 'no change' i. e. before and after the use of traditional medicine, their health status remained the same. 27% reported improvement in health status after the use of traditional medicine while 0.56% i.e. in one case among the user of NCD, the health status worsened after using traditional medicine, while nearly 45% had mix change in their health status after using traditional medicine. When analyzing by type of diseases among the users of traditional medicine, those suffering from NCDs, more than half of them responded improvement of their health status after using traditional medicine. The health status as 'No change' was also highest among NCDs followed by others disease. Overall from the analysis, the changes in health were found highest as 'mixed change' i. e. better on one dimension, but worse on another. It imply that 45% of the users of traditional medicine, the overall health status (in all the 5 dimensions) has not improved, though in some dimension of health it had improved. While 27% users of traditional medicine had overall improvement in the health status.

3.3. Bivariate Probit model of disease and type of healthcare

Choice of healthcare depends on psychological aspect among humans. When the patient feels that even using traditional medicine can cure the disease, then the patient will bypass modern healthcare. It all depends on the etiology and belief system of the patient about the disease. Therefore, in order to understand the interdependence between

the type of disease and the demand for traditional healthcare, bivariate Probit model was applied.

Table 3a shows the results for the bivariate Probit model of type of disease and type of healthcare by a set of explanatory variables. By type of disease, the coefficient estimates show that compared to younger age group, older age group were more likely to report suffering from NCDs rather than CDs & other diseases. Wealth index shows that those belonging to higher wealth index were more likely to report suffering from NCDs compared to CDs & other diseases. By tribe it shows that compared to Ao tribe, Sumi and Lotha tribe were less likely to report suffering from NCDs, it may be because the proportion of older age group is higher among Ao tribe compared to other tribes in the study population.

By type of healthcare it shows that older age group were more likely to use traditional medicine than allopathic medicine. Duration of sickness shows that, the longer the duration of sickness, they were more likely to use traditional medicine compared with allopathic medicine. It is also evident that those who had spend high healthcare expenditure, they were more likely to have used allopathic medicine. Thus, it reflects from the study that, traditional medicine is much cheaper when compared with modern healthcare. Again compared with Ao tribe, Sumi and Lotha tribe were less likely to use traditional medicine.

The bivariate Probit model shows the estimates of rho, the correlation coefficient for the error terms. The estimate is 0.311 and the chi-squared test of 10.48 shows that this estimate is significantly different from zero. This means that unobservable factors that are positively related to type of disease are also positively related to type of healthcare.

Table 3b shows results of the probabilities of type of disease and type of healthcare. it is evident that the probability of being suffering from NCDs and also used traditional medicine (p11) is 0.21. The probability of being suffering from NCDs and also used allopathic medicine (p10) is 0.14. The probability of being suffering from CDs & other diseases and also used traditional medicine (p01) is 0.26, and the probability of being suffering from CDs & other diseases and also used allopathic medicine (p00) is 0.39. Thus, it is clear from the analysis that being suffering from NCDs the probability of using traditional medicine is higher compared to allopathic medicine. On the other hand, being suffering from CDs & other diseases, the probability of using allopathic medicine is higher compared to traditional medicine.

4. Discussion

In Northeast India, it is observed that traditional healers belong to different groups like herbalist, diviners and birth attendants etc. that used various species of plants for treatment of ailments, but the most common part of plant utilized is the leaves.¹⁸ From the study, it is also

Table 3a

Bivariate probit model of type of disease and type of healthcare by background characteristics, Dimapur 2014.

Log likelihood = -428.38539			
Number of observation = 382			
Wald chi2(48) = 127.26			
Prob > chi2 = 0.000			
	Coef.	Std. Err.	P > z
Type of disease: “1” Non communicable diseases; “0” Communicable diseases & other diseases			
Age			
< 15*			
15–25	0.903	0.393	0.021
26–39	0.724	0.347	0.037
40–59	1.327	0.323	0.000
60+	1.616	0.342	0.000
Sex of the respondents			
Male*			
Female	-0.158	0.150	0.292
Education			
No formal schooling*			
Middle school	-0.141	0.285	0.621
High school	-0.062	0.295	0.833
Secondary and above	-0.056	0.345	0.871
Duration of sickness			
Less than 3 months*			
One year to 3 years	0.128	0.212	0.545
More than 3 years	0.157	0.186	0.398
EQ-VAS			
Lowest health status*			
Poorer health status	-1.879	1.157	0.104
Average health status	-1.126	1.101	0.306
Higher health status	-1.147	1.096	0.295
Highest health status	-1.051	1.094	0.336
Wealth index			
Poorest*			
Poorer	0.504	0.257	0.050
Middle	0.578	0.271	0.033
Richer	0.548	0.253	0.030
Richest	0.662	0.255	0.009
Healthcare expenditure			
Low*			
Average	-0.154	0.200	0.441
High	0.345	0.258	0.182
Very high	0.019	0.208	0.927
Tribe			
Ao*			
Angami	-0.150	0.200	0.453
Sema	-0.468	0.211	0.027
Lotha	-0.530	0.204	0.009

Type of healthcare: “1” Traditional medicine; “0” Allopathic medicine

	Coef.	Std. Err.	P z
Age			
< 15*			
15–25	0.840	0.338	0.013
26–39	0.935	0.289	0.001
40–59	0.789	0.273	0.004
60+	0.559	0.297	0.060
Sex of the respondents			
Male*			
Female	-0.132	0.144	0.359
Education			

Table 3a (continued)

No formal schooling*			
Middle school	-0.453	0.253	0.074
High school	-0.478	0.274	0.081
Secondary and above	-0.728	0.324	0.025
Duration of sickness			
Less than 3 months*			
One year to 3 years	0.193	0.211	0.362
More than 3 years	0.603	0.188	0.001
EQ-VAS			
Lowest health status*			
Poorer health status	0.174	0.863	0.840
Average health status	-0.539	0.799	0.500
Higher health status	-0.494	0.792	0.533
Highest health status	-0.414	0.790	0.601
Wealth index			
Poorest*			
Poorer	0.122	0.230	0.597
Middle	-0.126	0.245	0.607
Richer	0.014	0.231	0.950
Richest	-0.154	0.235	0.513
Healthcare expenditure			
Low*			
Average	-0.659	0.185	0.000
High	-0.946	0.254	0.000
Very High	-0.906	0.204	0.000
Tribe			
Ao*			
Angami	-0.043	0.198	0.827
Sema	-0.434	0.204	0.033
Lotha	-0.533	0.197	0.007
athrho	0.3217815	0.0994098	0.001
rho	0.3111168	0.0897876	
Wald test of rho = 0:	chi2(1) = 10.4776		Prob > chi2 = 0.0012

Note: * reference category.

Table 3b

Outcome variables and predicted probabilities from bivariate probit model, Dimapur 2014.

	Obs	Mean	Std.Dev	Min	Max
p11	382	0.209	0.162	0.002	0.687
p10	382	0.142	0.117	0.001	0.474
p01	382	0.255	0.174	0.038	0.798
p00	382	0.394	0.227	0.04	0.928

evident that indigenous Naga tribe in Nagaland still uses traditional medicine for different ailments. The preference for traditional health care is evident not only due to cultural attachment but also due to low payment and flexible payment system. While studying healthcare seeking behavior taking into consideration on traditional medicine is equally important to understand the whole gamut on individual health seeking behavior. It also determines how and at what stage of illness the patient demands traditional medicine thus revealing the choice and preferences of healthcare providers. So, recognizing the huge demand of bone-setters, the Government of Nagaland under NRHM, has incorporated traditional bone-setters into mainstream healthcare through AYUSH. Similarly, in this study it was also found that more than half of the respondents visited osteopathic/bone-setter, and also the use of naturopathy, so though bone-setter is incorporated through AYUSH yet there is also scope of expanding other types of traditional medicine as it

is evident from the study.

Several studies have found the use of traditional medicine for various other ailments not only in Nagaland and Northeast but also in states like Kerala and West Bengal. Among Kuruma tribe of Kerala, 34 plant species belonging to 32 genera and 25 families are used for treatment of cuts and wounds¹⁹, and among the tribal communities of Paschim, West Bengal, plant species were used for treatment of snakebite.^{20,21}

In cost effectiveness analysis use of EQ-5D showed improvement in health²², similarly the study also found an improvement of health status after using traditional medicine. The study found that while using PCHC analysis there was a 'mix change' in the health status, this may be because though traditional medicine can cure the disease yet while looking into the all the five dimension of health in some health dimension it may not have improved. It is also evident from the study that the probability of using traditional medicine when suffering from NCDs was higher compared to allopathic medicine, while for CDs & other diseases use of allopathic medicine was higher compared to traditional medicine. From the study it is also evident that those who suffer from longer duration of the disease they were more likely to use traditional medicine. It may be because the respondent may seek different types of healthcare for curing the disease and mostly among NCDs the duration of sickness is longer. Among user of allopathic medicine, the healthcare expenditure was high. But among users of traditional medicine, the healthcare expenditure was low. This may be because the payment system in traditional medicine is flexible. The traditional practitioner sometimes does not charge fees and also, the user can either pay in cash or in kind. As evident from the analysis that those who availed traditional medicine had low healthcare expenditure.

In Nagaland, belief in faith healer is also evident, which may have been influenced because of Christian beliefs. Diviners are the intermediaries between human and the supernatural, some of them used herbs and some use prayers for the treatment of the disease.¹⁸ Similarly, the study also found evident on the use of traditional faith healer for the treatment of disease and it may be because of the cultural belief of the cause of the disease.

5. Conclusion

The study clearly indicated that preferences for healthcare have cultural connotations. Traditional medicine has the potential and sustainability in the treatment of disease in a pluralistic healthcare system like in Nagaland. The study advocates looking at the health system holistically taking into account the indigenous traditional medicine/practitioners and protect indigenous knowledge. The tribal population relies on traditional medicine not only for primary healthcare but also due to low cost, aged old cultural belief and practices. Thus, it is important to conserve, protect and preserve the traditional medicine by providing efficacy through proper research and validation about the indigenous traditional medicine. Due to the existence of dominant modern healthcare, the practice among the younger generations for traditional system of medicine is reducing. Most of the sources of traditional knowledge are only among the few traditional practitioners. Therefore, promotion and development of traditional medicine will not only reduce the burden of healthcare expenditure, but also preserve the Naga rich culture of practicing indigenous medicine. The study found that for treatment of some diseases traditional medicine is more cost-effective than allopathy. As, from the analysis it is evident that those who availed traditional medicine, responded low health expenditure and also from PCHC analysis showed 27% of them got cured after using traditional medicine. Thus, it can help reduce the burden of healthcare

expenditure.

Therefore, exploration of this traditional medicine, validation, documentation and recognition through research is required from the stakeholders to popularize. As the study found improvement of health after using traditional medicine. Even though in Nagaland through NRHM the traditional bone-setter has been incorporated into mainstream healthcare under AYUSH, yet it is also equally important to recognize other forms of indigenous tribal medicine and thus preserve the traditional knowledge.

Conflicts of interest

The author declare that there is no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cegh.2019.07.002>.

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