

The use of medicinal plants in healthcare practices by *Rohingya* refugees in a degraded forest and conservation area of Bangladesh

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People in developing countries traditionally rely on plants for their primary healthcare. This dependence is relatively higher in forests in remote areas due to the lack of access to modern health facilities and easy availability of the plant products. We carried out an ethno-medicinal survey in Teknaf Game Reserve (TGR), a heavily degraded forest and conservation area in southern Bangladesh, to explore the diversity of plants used by *Rohingya* refugees for treating various ailments. The study also documented the traditional utilization, collection and perceptions of medicinal plants by the *Rohingyas* residing on the edges of this conservation area. We collected primary information through direct observation and by interviewing older respondents using a semi-structured questionnaire. A total of 34 plant species in 28 families were frequently used by the *Rohingyas* to treat 45 ailments, ranging from simple headaches to highly complex eye and heart diseases. For medicinal preparations and treating various ailments, aboveground plant parts were used more than belowground parts. The collection of medicinal plants was mostly from the TGR.

Keywords: medicinal plants; diversity; healthcare; *Rohingyas*; Teknaf Game Reserve

Introduction

All cultures from ancient times have used plants for medicinal purposes (WWF 1993). Even today, people throughout the world widely use plants as natural remedies, and almost 80% of the population in developing countries is heavily dependent on these plant products for their primary healthcare (Farnsworth et al. 1985; Farnsworth and Soejarto 1991; Pei 2001; Mukul et al. 2007). Probably knowledge of the medicinal properties of plants probably predates the agricultural age, beginning when humans were still hunters and gatherers, inhabiting primary forests and their associated savannahs (Ahmed and Gaby 1996). At present the global demand for herbal remedies is not only large but is rapidly growing, implying a need for sustainable forest utilization and management to ensure long-term supplies (Yusuf et al. 1994; Srivastava 2000).

Bangladesh, due to its location and favourable climate, is exceptionally endowed with a vast variety of flora, including medicinal plants. Of more than 5700 angiosperms in the country, more than 500 are supposed to have medicinal properties (Yusuf et al. 1994; Dixie et al. 2003). These plants are the foundation for all the traditional healthcare systems strictly maintained and followed by rural and tribal peoples in the country, particularly those residing in remote areas. Presumably, all such communities have an indigenous knowledge (IK) system on herbal medicine that could be considered the basis of all systems of traditional remedies in Bangladesh. IK is used during the preparation of traditional *Unani*, Ayurvedic and homeopathic medicines (Khan et al. 2005).

Our study aimed to elucidate the diversity of medicinal plant use, and utilization patterns among the *Rohingyas*

living in and around the Teknaf Game Reserve in southern Bangladesh. This is the first attempt to gather in-depth information on the plant species used by the *Rohingyas*, as well as associated IK concerning plant collection and preparation, which is now under threat due to rapid deforestation.

The *Rohingyas*

Rohingyas are the people mainly migrated from the Rakhine State in Myanmar to Bangladesh in the early 1960s (Mollah et al. 2004). By 1993, about 233,000 *Rohingyas* had been resettled in Myanmar and some 30,000 remained in the Cox's Bazar district, mostly in Teknaf (Bari and Dutta 2004) (Figure 1). At present, about 22,000 refugees are reported to be waiting for repatriation from the Kutupalong and Nayapara camps in Cox's Bazar district. There are two camps (Nayapara Refugee Camps 1 and 2) inside the Teknaf Game Reserve, with a total population of 12,617 *Rohingyas* (Ashad personal communication 2006). Large populations of *Rohingyas* also live outside the camps in the south and southeastern parts of Bangladesh. Representatives of non-governmental organizations place the figure at anywhere between 100,000 and 350,000 people (Sajjad 2003). Experts believe that many of those who do not live in the camps returned to Bangladesh after being repatriated to Myanmar. In fact, the *Rohingyas* who came to Bangladesh again after the large evacuation in the early 1990s have been denied entry to the camps and are not recognized as refugees by the government, which, like the United Nations High Commission for Refugees (UNHCR),

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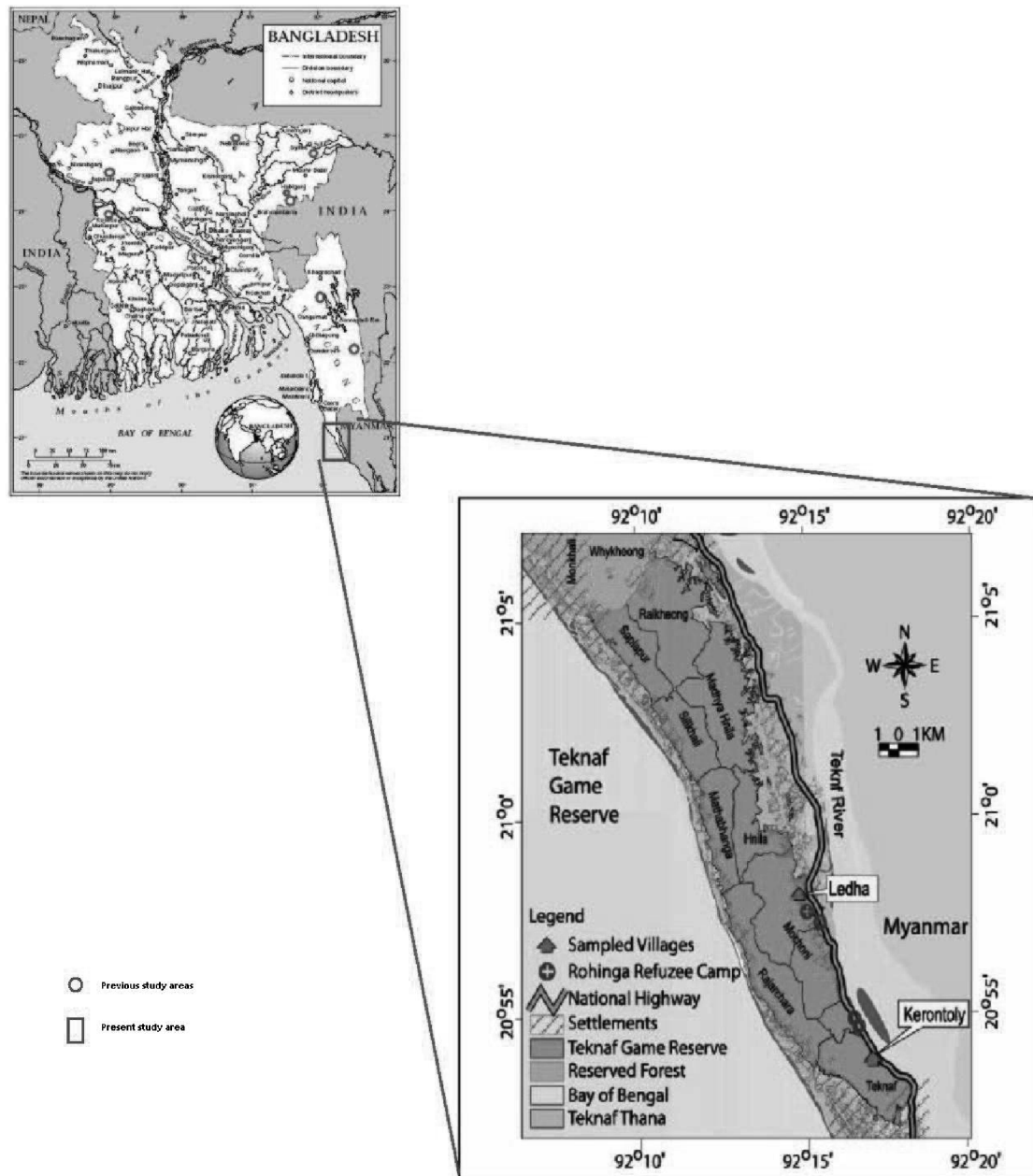


Figure 1. Location map of the study area.

considers them to be illegal immigrants (Sajjad 2003). These *Rohingyas* have settled in various villages and have encroached into the adjacent forests.

Study area

Teknaf Game Reserve (TGR) comprises an area of 11,615 ha within the larger Teknaf Reserve Forest (Figure 1) and has been designated as a protected area since 1983 (Mukul 2007). This is the sixth largest protected area in the country and a natural migration area for the Asian elephant (*Elephas maxima*). The area lies between $20^{\circ}52' - 21^{\circ}09' N$ and $92^{\circ}08' - 92^{\circ}18' E$ (Rosario 1997) and includes a 23-km long hilly ridge between the Teknaf peninsula sea beach and the Cox's Bazar–Teknaf road. The northern end of TGR begins 48 km south of Cox's

Bazar in Teknaf thana, a sub-district of Cox's Bazar, just west of Whykeong Bazar. The southern end is just north of Teknaf town (NSP 2006). The coastal and hill areas of TGR offer a variety of habitats, including evergreen and semi-evergreen hill forests, tidal mudflats and mangrove vegetation. The forest has been heavily degraded by local people and migrants, and this accelerated after the occurrence of several cyclones in the early 1990s. There are 115 settlements (locally called *paras*) in the area, including 14 settlements predominantly inhabited by the *Rohingyas* (Mollah et al. 2004).

Methods

We conducted the survey during several field visits in 2006, and used a semi-structured questionnaire. Two villages,

Table 1. Location of the villages and numbers of households sampled.

Settlement/ village	Location	No. of <i>Rohingya</i> households (<i>N</i>)	No. of households sampled (<i>n</i>)
Ledha	Inside and outside the game reserve	110	22
Kerontoly	Inside the game reserve	78	16
Total		188	38

Table 2. Age distribution of the survey respondents.

Age-group	Men	Women	Total
<30	1 (3)	2 (5)	3 (8)
31–40	2 (5)	1 (3)	3 (8)
41–50	4 (10)	3 (8)	7 (18)
50–60	8 (21)	9 (24)	17 (45)
>60	3 (8)	5 (13)	8 (21)
Total	18 (47)	20 (53)	38 (100)

Note: Values in the parenthesis indicate the percentage.

Ledha and Kerontoly, were selected randomly for the study. Ledha is located in Mosuni Forest Beat, and Kerontoly is in Teknaf Sadar Beat of TGR. Of the 188 *Rohingya* households within the two study villages, we selected 38 households, representing 20% of the total population, for the semi-structured interviews. We interviewed mainly older men and women from these households using a local guide in each site. Tables 1 and 2 provide information of our sample villages, with population and age distribution of the respondents.

Results and discussion

All the *Rohingyas* (i.e. 100%) are poor to extremely poor, primarily due to their lack of any permanent legal status in Bangladesh. Due to an excess of manpower (mainly unskilled labour), the local labour market is highly competitive, resulting in a lower wage rate for the *Rohingyas*. Their monthly income is below Tk 2000 (US\$29), which sometimes exceeds their family expenditure. Average household size in the two study villages is about six persons per family. The illiteracy rate is around 88%, mainly because parents are not willing to send their children to school during the day or in working periods, so that they can help with household activities (mainly farming and fuelwood collection) and earn money. Most *Rohingyas* live in places that are officially part of the TGR. They also use the adjoining forests illegally to sustain their livelihoods.

We observed that *Rohingyas* live in unhygienic conditions and suffer from many chronic diseases. In the absence of modern health facilities, they depend extensively on plants to treat their ailments. Most of the older men and

Table 3. Medicinal plant diversity documented from different areas of Bangladesh.

Study area	No. of families identified	No. of species identified	Author(s)
Thanchi, Bandarban hill region	–	39	Miah and Chowdhury 2003
Barind Tract of Bangladesh	–	100	Siddique et al. 2004
Khagrachari, Rangamati and Bandarban district	44	87	Alam 1992
Netrokona district	18	23	Uddin et al. 2009
North-eastern Bangladesh	32	38	Uddin et al. 2008
Northern Bangladesh	29	40	Mukul et al. 2007
Satchari National Park, Sylhet	27	38	Uddin and Mukul 2007
South-eastern Bangladesh	34	47	Halim et al. 2007
Teknaf Game Reserve, Cox's Bazar	28	34	Uddin and Khan 2007
Whole of Bangladesh	–	546	Yusuf et al. 1994

women have knowledge of medicinal plant use and preparation, and claim that this knowledge is becoming vulnerable due to the local disappearance of many medicinal plants. For simple ailments, they usually do not consult herbal practitioners. However, for comparatively complicated diseases, they consult local traditional healers – known as *boiddah*, *kabiraj* or *hakime* – who collect medicinal plants from adjoining forests and the reserve.

In Bangladesh, researchers from across the country have reported that many plants having medicinal value (Table 3). Our study identified 34 plant species in 28 families (Table 4) used by the *Rohingyas* for their healthcare: trees (38%), herbs (29%), shrubs (21%), climbers (9%) and palms (3%). The botanical and local names of the plants, habit and parts used are shown in Table 4. Most of the species are collected from the forest (49%) followed by homegardens, agricultural land, roadsides, and other places (e.g. fallow land, local markets) (Figure 2).

For medicinal preparations, people mostly use above-ground plant parts (78%), followed by belowground parts (15%) and whole plants (7%). Of the aboveground plant parts, leaves are used most frequently (25%), followed by

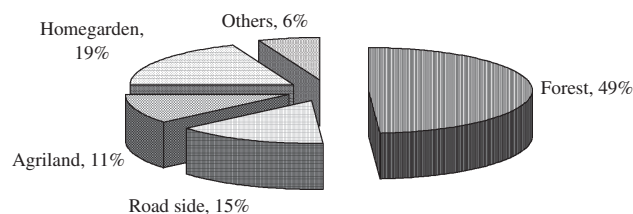


Figure 2. Sources of medicinal plants.

Table 4. Medicinal plants in the Teknaf Game Reserve and their uses.

Botanical name	Local name	Family	Parts used	Traditional use	Uses ¹ (%)	Occurrence	Main sources	Habit
<i>Abroma augusta</i> L.	Ulatkambal	Sterculiaceae	Bark, root	Abortion	21	C	R	H
<i>Adhatoda vasica</i> Nees.	Basak	Acanthaceae	Fresh green leaves	Cough, cold ailments, malaria, asthma	45	FC	F	Sh
<i>Aegle mermelos</i> L.	Bel	Rutaceae	Fruit	Weakness and diarrhoea	33	C	H, F	Tr
<i>Alstonia scholaris</i> Br.	Chatim	Apocynaceae	Leaf, bark	Fever, astringent, tonic	11	R	F	Tr
<i>Ananas sativus</i> L.	Anaras	Bromeliaceae	Fruit	Jaundice	36	C	F	H
<i>Areca catechu</i> L.	Supari	Palmae	Fruit, leaves	Rheumatism, sex stimulant, constipation, digestive, tooth disease	13	C	F	Tr
<i>Azadirachta indica</i> A. Juss.	Neem	Meliaceae	Leaves, seed, bark	Skin diseases, chickenpox, antiseptic, ulcers, fever, dysentery, diabetes	58	C	F	Tr
<i>Bombax ceiba</i> L.	Shimul	Bombacaceae	Bark, roots	Diarrhoea, dysentery, cough, leucorrhoea, fever	9	R	F	Tr
<i>Calotropis calycinum</i>	Akanda	Asclepiadaceae	Leaf, latex	Gout pain, constipation, cough, asthma, fever, urinal problem	31	FC	R	Sh
<i>Carica papaya</i> Linn.	Papeya	Caricaceae	Fruit, latex and seed	Stomach trouble, asthma, skin disease	57	C	A, H	Sh
<i>Centella asiatica</i> L.	Thankuni	Hydrocotylaceae	Whole plant	Dysentery diarrhoea, gastric	44	FC	H	H
<i>Citrus acida</i> L.	Jambura	Rutaceae	Fruit	Jaundice	29	FC	F, H	Sh
<i>Citrus limon</i> (L) Burm. f.	Lebu	Rutaceae	Fruit, leaves	Digestive, fever, loss of appetite, cough, bronchitis	65	C	F	Sh
<i>Cocos nucifera</i> L.	Narikel	Arecaceae	Tender fruit	Hair loss	41	C	R	Pa
<i>Curcuma longa</i> L.	Holud	Zingiberaceae	Rhizome	Skin ailments	61	FC	H, O	H
<i>Cynodon dactylon</i> L.	Durba grass	Gramineae	Tender leaves	Toothache, cut, wounds	68	C	F, R	H
<i>Derris trifoliata</i> Lour	Gila lata	Papilionaceae	Whole plant	Not specified	46	FC	F	Cl
<i>Eupatorium odoratum</i> L.	Assam lata	Compositae	Green leaves, flower	Cuts and wounds, narcotic, fever, cough, diabetes	51	FC	F	Cl
<i>Lawsonia inermis</i> L.	Mendi	Lythraceae	Leaves, bark, seed and flower	Skin disease, jaundice, spleen disease, headache, hair loss, rheumatism	26	C	H	Sh
<i>Leucas aspera</i> Spreng	Donkalos	Labiatae	Whole plant	Cold ailments, snake bite, skin disease, rheumatism	17	FC	F	H
<i>Mikania cordata</i> Rob.	Assam pata	Compositae	Green leaves	Cuts and wounds	40	FC	F	Sh
<i>Mimusops elengi</i> L.	Bakul	Sapotaceae	Fruit, bark	Dysentery, astringent, tonic, fever	8	R	F	Tr
<i>Moringa oleifera</i> Lamk.	Sajna	Moringaceae	Bark, leaves, roots	Paralysis, fever, epilepsy, rheumatism, cold ailments, spleen disease	25	C	H	Tr
<i>Musa sapientum</i> L.	Banana	Musaceae	Root, fruits	Dysentery, diarrhoea and stomach problems	65	C	A, H	H
<i>Phyllanthus emblica</i> L.	Amoloki	Euphorbiaceae	Fruit	Dysentery, cough, cold, vomiting, hepatitis, dyspepsia, skin diseases, hair loss, digestive problem	57	FC	F	Tr
<i>Piper betel</i> Linn.	Paan	Piperaceae	Green leaves, roots	Constipation, sex stimulant, digestive, ear disease, diarrhoea, fever	40	C	A	Cl
<i>Sonneratia apetala</i> Buch. Ham.	Keora	Sonneratiaceae	Leaves, bark	Fever, stomach problems	25	C	F, O	Tr
<i>Tectona grandis</i> L.f.	Shegon	Verbenaceae	Roots, flower, fruits	Hair growth, urinary problems	13	FC	F	Tr
<i>Terminalia arjuna</i> Bedd.	Arjun	Combretaceae	Bark	Heart disease, piles, bone fracture		FC	F, R	Tr
<i>Terminalia bellerica</i> Roxb.	Bohera	Combretaceae	Fruit, bark	Constipation, amnesia, jaundice, cough, stomach problems, dysentery, rheumatism, astringent, eye disease	57	C	F	Tr

(Continued)

Table 4. (Continued).

Botanical name	Local name	Family	Parts used	Traditional use	Uses ¹ (%)	Occurrence	Main sources	Habit
<i>Terminalia chebula</i> Retz	Horitaki	Combretaceae	Fruit	Dysentery, headache, hepatitis, constipation, fever, heart disease, cough, urinary problems	57	C	F	Tr
<i>Vitex negundo</i> L.	Nishinda	Verbenaceae	Leaves	Skin disease, rheumatism, cough, headache	22	R	F	H
<i>Vitex quadrangularis</i> Wall.	Harzora	Verbenaceae	Whole plant	Bone fracture	27	FC	F, R	H
<i>Zingiber officinale</i> Roxc.	Ada	Zingiberaceae	Rhizome	Cough, constipation, vomiting, tonsil, toothache, ailments	65	C	A, H	H

Key: Tr – Tree; H – Herb; Sh – Shrub; Cl – Climber; Pa – palm; C – common; FC – fairly common; R – rare; F – Forest; H – Homegarden; R – Roadside; A – Agriland; O – Other

No. of uses¹ = number of people reporting medicinal plants use in relation to the total number of times that particular species was cited.

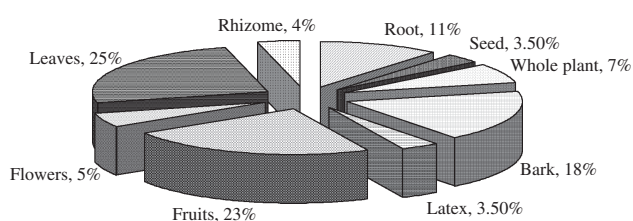


Figure 3. Plant parts used for medicinal purposes.

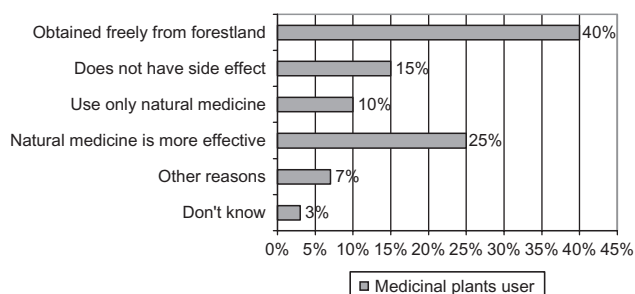


Figure 4. Reasons for using medicinal plants.

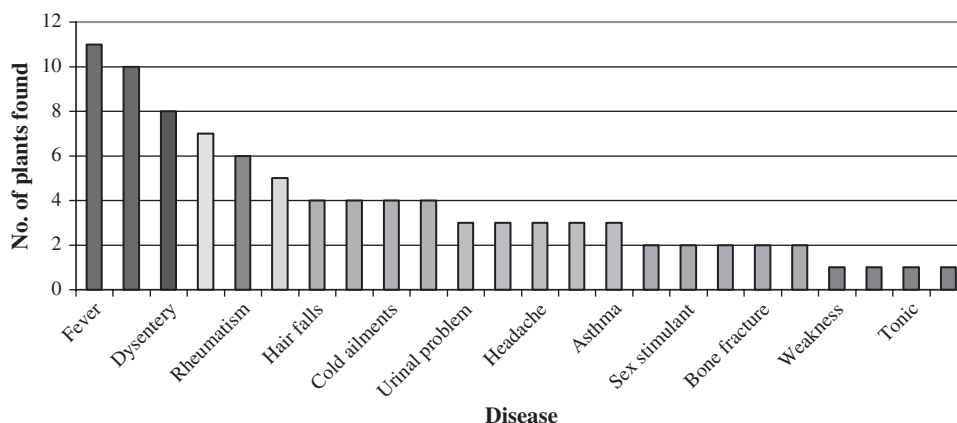


Figure 5. Number of medicinal plants used for treating major ailments.

fruits and bark. In most cases, the juice from leaves and bark are used in medicines, while fruits are eaten raw. Different belowground plant parts, such as roots and rhizomes, are also used to treat ailments (Figure 3).

The major uses of medicinal plants mentioned by the respondents are summarized in Figure 4. Plants identified in the area are used to treat 45 conditions, ranging from simple headaches to highly complicated eye and heart diseases, including diabetes, jaundice and chickenpox. The total number of conditions treated by respondents in the previous 6 months is given in Table 5; when the same species is used to treat the same disease more than once, it is counted as a single case. Medicinal plants are generally used to treat fever, coughs, cuts and wounds, cold ailments, tooth disease, hair loss, skin diseases and weakness. The largest number of medicinal plant species are used to treat fever (11 species), followed by coughs, dysentery, skin diseases and rheumatism. More than one species is used for treating some common conditions: cuts and wounds, cold ailments, hair loss, vomiting, etc. (Figure 5). In most cases, only one species is used to treat an ailment at a time, but in some cases a mixture of several species is also used.

Our survey indicated that the *Rohingyas* are willing to share their traditional medicinal knowledge with their own

Table 5. Names of diseases and conditions and number of people who used medicinal plants to treat them.

Disease or condition		No. of cases reported
English	Local (Bangla) name	
Fever	Jor; Shordi jor	53
Cough	Kashi	47
Cut and wounds	Kata o khoto	45
Cold ailments	Thandar pira; Thandar ohshuk	36
Teeth disease	Dater rogh	32
Hair loss	Chul pora	30
Skin diseases	Chormo rogh	29
Weakness	Durbolata	26
Digestive	Hojom	25
Dyspepsia	Bod hojom	25
Vomiting	Bomi	21
Diarrhoea	Pater ohshuk; Udaramoy	19
Diabetes	Bohu-mutro rogh	17
Headache	Mathahbetha	15
Urinal problem	Mutro somossha	13
Sex stimulant	Jouno bordhok	12
Tonic	Bolkarok	10
Dysentery	Rakto amasha	8
Jaundice	Pandorough; Jaundice	8
Gastric	Pakostholir rogh	7
Asthma	Hapani	6
Bone fracture	Har vanga	6
Heart disease	Hrid rogh	6
Rheumatism	Bat rogh	6
Antiseptic	Jibanu nashok; nibarak	5
Constipation	Kosto kathinna	5
Eye disease	Chokher rogh	5
Hepatitis	Jokriter prodaho	5
Snake bite	Shaper kamor	5
Ulcer	Pakostholir khoto	5
Gout pain	Shorirer mangshe betha	4
Tonsil	Golo gronthite betha	4
Abortion	Gorvopat	3
Astringent	Rokto shonchalon bondo	2
Bronchitis	Shas kosto	2
Chicken pox	Jaloboshonto; Panboshonto	2
Epilepsy	Mrigi rogh	2
Malaria	Malaria jor	2
Paralysis	Pokkhaghat; Shoktihin oboshta	2
Amnesia	Srithivrongsho	1
Loss of appetite	Khudamonda	1
Narcotic	Tondrakarok	1
Piles	Orsho rogh	1
Spleen disease	Plliha rogh	1
Stomach problem	Peter somossha	1

people, but not with outsiders. Older people possess more knowledge regarding the uses and identification of medicinal plants; in most cases, this knowledge is orally transferred from one generation to the next. Throughout the study, the older people claimed that they have less knowledge about preparation and the use of medicinal plants than their grandparents, who lived in Myanmar, and that the present/younger generation knows less than them. This perception indicates a gap or erosion in the indigenous knowledge system regarding medicinal plants that should be investigated for the wellbeing of future generations, as

well as for science. We also found that local people are aware of the degradation or disappearance of medicinal plants growing in the forest and surrounding habitats.

Conclusion

The study showed that the *Rohingyas* collect medicinal plants from wild sources, and that this may threaten the diversity of these plants in their natural habitats. The *Rohingyas* were concerned about the drawbacks of wild harvesting because they realize that they now have to travel even further to collect these plants. In Bangladesh, because so many species of plants have medicinal uses, medicinal plant conservation is, in some ways, a microcosm of plant conservation as a whole. Creating more awareness and introducing these medicinal plants through annual enrichment of forest plantations could positively affect the country's declining stock of such plants. Our study also shows that the *Rohingyas* have inherited a rich traditional knowledge regarding the ethno-medicinal uses of plants. This paper should not only provide recognition of this knowledge but also help in its conservation vis-à-vis providing pharmacological leads for production of new medicines.

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