


(Slide 3)

From community



New way of thinking!

- ◆ **Let's not make patients !**
 - Health promotion·disease
 - Prevention/early detection
 - Knowledge and awareness raising by performance
- ◆ **Health notebook·health handbook**
 - It used to be used for animals, but now for humans!

1983 : This idea was introduced to a Japan's ageing health law

(Slide 4)

In Japan

Psychological tasks of the universal health insurance system of Japan

- ◆ **Lowering of volition for self-management of health**
 - Mental disposition to easily visit hospitals/clinics, leaving his/her own health in the hand of specialists
 - Steep rise in the national healthcare expenditure
(Shimura T. The era of UHC in Japan, Hosei Univ Press, 2011: p.55)
- ◆ **Patients are too accustomed to convenience**
 - Sudden increase in the number of emergency patient transports
 - All residents: 3.24 million (1996) → 4.89 million (2006)
 - 65 ≥ years of age: 1.06 million (1996) → 2.20 million (2006)
(Yamaoka J The UHC is in Danger, Heibonsha, 2011: p. 35)

UHC Crisis

experience of using livestock registers. At that time the village had many livestock, and a good system had been developed for checking the health of livestock, since the death of farm animals meant financial problems. And so the idea was to apply these registers for people to avoid people getting sick. This concept is not limited to Japan. When I met a specialist fighting polio in western Africa I heard that there are ethnic minorities who were hesitant to receive vaccination; however, similar to Yachiho Village, the ethnic minorities were vaccinating and managing the health of their livestock. With this information in hand, the medical personnel could say, "If you vaccinate your animals, you should also vaccinate your children." With this argument, the vaccination program went well.

After these health promotion activities, Yachiho Village could drastically reduce its healthcare costs. Data show that the village saved 200,000 yen per senior citizen in healthcare costs, or 200 million yen for a population of 1,000, as the outcome of 50 years of effort. Their community health programs also had a major impact on national policy.

It was Saku Central Hospital that supported these efforts. I am sure that most of you know about Saku Central Hospital, I would like to emphasize the efforts they made through theater and movies. Such art-based approaches created a rapport with the people and were extremely beneficial in practicing community health activities. The inspiration for these efforts came from the ideas of Kenji Miyazawa, an early twentieth-century poet and modernist. Accord-

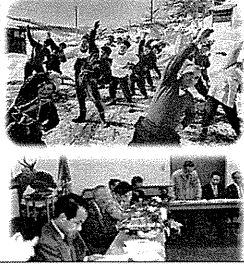
ing to Miyazawa, one of keys to successful cultural activities in a rural community is to perform drama as an actor. Inspired by these words, Dr. Shunichi Wakatsuki, director of Saku Central Hospital, started theatrical activities and movies. Such activities are not limited to Japan; similar efforts have been made in other countries such as the UK, Australia, and South Africa. The importance of the arts in community health is suggested in a book entitled *Arts Development in Community Health: A Social Tonic*. In this way, the efforts undertaken by Dr. Wakatsuki have been similarly implemented in the world, not just in Japan.

Now let's turn our attention to the present. Japan's UHC has been maintained comparatively well thus far. Nevertheless, there are problems, such as the aging of the population. Figuring out how to resolve these problems has become a major issue. Several researchers have pointed out the psychological challenges brought about by this system. They wonder whether the spread of this system has caused a decline in awareness of the need to manage one's own health by oneself. People have come to perceive that they can leave their health issues to specialists, since health services are easily accessible. And the researchers question whether such an attitude has caused the rapid rise in the national healthcare expenditure. For example, ambulance transport has increased enormously as more and more patients become too accustomed to convenience. The number of patients who used an ambulance increased from 3.24 million in 1996 to 4.89 million in 2006. Meanwhile, patients

(Slide 5)

From community to the world

Finally: UHC by All



◆ **Who are players to achieve UHC?**

- Not only health finance specialists
- Community people, local government, doctors, nurses, public health nurses, health volunteers..

Old pictures are taken from 'Health volunteer stories' http://www.sakuhp.or.jp/yachiho/sidouin_back/sidouin100/sidouin16.htm

aged 65 and older more than doubled, from 1.06 million to 2.20 million. Thus, the reasoning goes, soaring healthcare costs are associated with the patients who are overly accustomed to convenience. And so the challenge now is to figure out what can be done in community health to counter this trend (Slide 4).

Put another way: a community research specialist, John L. Mcknight, said this. "As the power of a system, such as Japan's UHC, grows, the power of community declines. As control magnifies, consent fades. As standardization is implemented, creativity disappears. As consumers and clients multiply, citizens lose power. To build a healthy society, we need two tools: a system and a community." It is important to strengthen systems. But, unless communities

become just as strong, a balanced society will not be created. A book has come out in Japan that addresses those kinds of questions. An English translation of the title would be something like *Toward a Society with Community Health*. It is a very useful book, and it introduces many examples of community health activities in Japan.

For example, in Kochi Prefecture there is something called "lively 100-year-old exercise." The other day I went to Ghana, where people were doing *yosakoi dance*, an energetic form of traditional Japanese dancing. Perhaps people will start doing lively 100-year-old exercise in Ghana, Thailand, and other places to get healthy. It really is a great community health action. This is something worth disseminating to the rest of the world. In that sense, it is becoming increasingly certain that community health and global health are two sides of the same coin nowadays.

Systems are important. But, it is the power of everyone together that brings a system into fruition. At the beginning of my talk, I mentioned the phrase "Health for All." Now, the important message is not "Universal Health Coverage for All" but rather "Universal Health Coverage by All" (Slide 5). Community health has a very big role to play toward that end. The members of prefectural medical associations involved in the realization of community health will make a big mark in the future. I hope that you will all do your best with the thought that someday what you are doing now will be accepted throughout the world.

Comment



Akira AKAGAMI²

Dr. Jimba's talk noted the need for both top-down and bottom-up policy approaches when

establishing a community health and medical system in developing countries. He used the example of initiatives by Yachiho Village in Nagano Prefecture during the creation of Japan's universal health insurance system to highlight the importance of the role of bottom-up approaches. I felt that the talk was very instructive, considering the various problems faced by the current universal health insurance system.

² Tokyo Medical Association, Tokyo, Japan. Member of the JMA Global Health Committee.

Within the social milieu in Japan, which has a rapidly graying population with a declining birth rate, an important role of community health will be to establish comprehensive community-care systems appropriate to the special characteristics of each community.

I would like to take this opportunity to introduce initiatives of local medical associations in regards to 1) emergency geriatric care and 2) 24-hour at-home care systems.

1) Emergency geriatric care: I live in the Hachioji City in Tokyo. Emergency transport of elderly patients has been increasing with the aging of the population. Dr. Jimba mentioned that patients are sometimes refused because of lack of space at medical institutions, and it is becoming increasingly difficult to find hospitals to transport patients to. In Hachioji, the Hachioji Geriatric Emergency Medical System Network was launched and an Emergency Medical Information Form (Fig. 1) created as a measure to establish a reliable and safe emergency transport system to handle the emergency requests of senior citizens. The participating institutions are emergency hospitals, psychiatric hospitals, geriatric facilities, nursing care companies, the fire department, Hachioji City, and the medical association. The special feature of this Emergency Medical Information Form is that it includes, in addition to the general medical information, check boxes for items that the patient would like to communicate to the doctor just in case, such as: "I want lifesaving and life-support measures taken as much as possible," "I want measures taken if they will ease pain," and "I want to be watched over in as natural a condition as possible." This form is for senior citizens aged 65 and older, and I think that it is important for older persons to talk in advance with their families about the kind of end-of-life care they would like to have.

2) 24-hour at-home care systems: Last year the Tokyo Metropolitan Government commissioned the Tokyo Medical Association to create an at-home mutual assistance system. The Hachioji Medical Association took over this project and is studying the establishment of an at-home care

system to assist member physicians.

With respect to at-home care, many physicians tend to be hesitant about home visit care for reasons such as they are too busy with outpatients to do home visit care or that it is difficult to respond on weekends, at night, or while traveling. So, we are considering three-way cooperation among primary care physicians, visiting nursing stations, and enhanced at-home assistance clinics.

The first step is to set up visits from a 24-hour visiting nursing station to the patient who will receive at-home care. This puts medical information such as visit instructions and visit nursing records in the station. The second step (Fig. 3) is to have a system for handling emergency house call requests at times when the patient's primary care doctor is not working, such as on days off, at night, or while traveling. As the first call, the visiting nursing station contacts the primary care doctor. If the primary care doctor cannot respond, a second call is made, this time to an enhanced at-home assistance clinic (on a rotating system), and the assistance clinic on duty will respond. The progress is then reported to the primary care doctor the following day. Future challenges will be to deepen cooperation between the government and logistical support hospitals, to develop safe IT for sharing information, and to conduct publicity so that more doctors can participate in at-home care.

Lastly, Figure 4 shows the medical association perspective for establishing comprehensive community-care systems. President Nonaka of the Tokyo Medical Association prepared this figure. The Tokyo Medical Association has expressed its active support for the creation of a medical provision system and comprehensive community care through the cooperation of local medical associations and multi-occupation organizations, for the benefit of people who live in the community. The elevation of bottom-up policies is critical for medical initiatives from the perspective of residents, from local medical associations to the Tokyo Medical Association and then up to the Japan Medical Association: the local medical associations can play such important roles.

RESEARCH ARTICLE

Open Access

Female community health volunteers service utilization for childhood illness- improving quality of health services only is not enough: a cross-sectional study in mid-western region, Nepal

Moe Miyaguchi^{1†}, Junko Yasuoka^{1*†}, Amod Kumar Poudyal^{2†}, Ram Chandra Silwal^{3†} and Masamine Jimba^{1†}

Abstract

Background: Female Community Health Volunteers (FCHVs) are considered service providers for major health problems at the community level in Nepal. However, few studies have been conducted about the roles of FCHVs from the users' perspective. This study sought to examine the current status of FCHV service utilization and identify the determinants of caregivers' utilization of FCHVs' health services in the mid-western region of Nepal.

Methods: This cross-sectional study targeted 446 caregivers of children under five years of age and whose children had ever fallen ill in the study village development committees (VDCs) of three districts of Nepal. Caregivers were asked about their usual health practices for childhood illness, health service utilization for childhood illness, children's health condition, satisfaction with health services, and socio-demographic status. Descriptive statistics and multiple logistic regression were used for analysis.

Results: Among 446 caregivers, 66.8% had never sought care from FCHVs for their children's illnesses in their lifetime, and more than 50% of them were unaware of FCHVs' services for acute respiratory infection and diarrhea. Among 316 caregivers whose child had an illness during the last seven months, 92.3% of them (n = 293) did not take their child to FCHVs. The main reasons were the lack of medicine available from them and their incompetency in providing care. Among the 446 caregivers, those who participated in a mothers' group (n = 82) were more likely to use FCHVs' services in their lifetime (AOR = 3.23, 95% CI = 1.81-5.76).

Conclusions: Caregivers can gain benefit by using FCHVs' health services, but a majority of the caregivers did not seek care from FCHVs due to its limited quality. Raising caregivers' awareness on FCHV is equally important at community level.

Keywords: Child health services, Health care seeking behavior, Female community health workers, Nepal

Background

Child mortality still remains high in developing countries. In 2011, 6.9 million children died in the world, and an estimated 83% of under-five deaths occurred in Sub-Saharan Africa and Southern Asia [1]. Acute respiratory infection (ARI) and acute diarrheal disease (ADD) are the major killers of children under five, and both are

preventable and treatable by various existing interventions including feeding practices, oral rehydration salts (ORS) and antibiotics [1,2].

To improve treatment, a well-trained health workforce plays a key role, but the lack of such a trained health workforce has been one of the main challenges in developing countries [3]. To tackle this problem, Community Health Workers (CHWs) have been introduced into resource-limited, rural areas [4-6]. The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) have issued a policy statement to promote pneumonia and diarrhea management by CHWs [7,8].

* Correspondence: jyasuoka@m.u-tokyo.ac.jp

†Equal contributors

¹Department of Community and Global Health, the University of Tokyo, Tokyo, Japan

Full list of author information is available at the end of the article

Among several targeted countries, several CHW interventions were successfully carried out in hard-to-reach populations in developing countries [5,9].

Nepal is one of the countries most well positioned to achieve Millennium Development Goal 4. Over the past two decades, the country's under-five child mortality rate has been reduced by 65%, from 158 in 1990 to 54 in 2010, a notably low rate compared to other Asian developing countries [1,10]. To achieve this, Nepal has implemented community-based maternal and child health programs, such as immunization and micronutrient interventions, through trained Female Community Health Volunteers (FCHVs) [9,11].

In Nepal, nearly 50,000 FCHVs have been mobilized for prevention, diagnosis, and treatment services at the community level [12,13]. FCHVs are locally recruited women, ready to work voluntarily and usually selected by mothers' group. After attending an 18-day training, they offer community-based health and family planning services, including safer motherhood, newborn care, immunization, nutrition counseling, communicable and epidemic disease control, and health education [12]. FCHVs also diagnose ARI and treat children with cotrimoxazole; identify ADD and treat with ORS and zinc as part of the community-based integrated management of childhood illness (CB-IMCI) program, which has reached and provided nationwide coverage since 2009 [12-14].

Several studies have confirmed the success of FCHV interventions toward improving child health and reducing child mortality in Nepal. Trained FCHVs can offer health services of almost equivalent quality to those provided by facility-based health workers; for example, they can correctly diagnose, treat, and recognize danger signs of common childhood illnesses [15]. ARI-specific mortality was reduced with community-based treatment of childhood pneumonia provided by CHWs including FCHVs in Jumla district, a remote mountainous area of Nepal [16]. Another study showed that community-based IMCI programs provided by FCHVs increased ARI case detection from 1,290,632 in 2004 to 1,498,356 in 2006. As for diarrhea, the number of severe diarrhea episodes was significantly lower in districts with community-based IMCI conducted by FCHVs than in districts without the program [17]. From 2011 to 2012, FCHVs treated 55% of ARI and 55% of diarrheal cases [18].

Despite such reported effectiveness of FCHVs, their child health services have been limited. The 2011 Nepal Demographic and Health Survey (DHS) reported that, many children's caregivers seek treatment at health facilities, while only 3% went to FCHVs [10]. Utilization of FCHVs' services was higher in the Nepal Family Health Program survey, which was conducted mainly in rural areas, but still only 14% of caregivers sought care from FCHVs [19]. In rural areas, most people visit traditional

healers first when they fall ill [20], especially among those of low socio-economic status [21]. For childhood illness, self-medication or traditional medicine are commonly pursued treatment options, but most research has focused on health facility utilization. Also, little research has addressed how other health services, such as FCHVs and traditional healers, are utilized.

Caregivers' health care-seeking behavior is an important factor influencing childhood illness management. In developing countries, several studies have reported a variety of determinants of health care-seeking behavior for childhood illness- including caregiver's education level, economic status, age, and ethnicity; distance to the health facility; child's age; child's nutritional status; caregiver's recognition of illness severity; caregiver's prior participation in health education; caregiver's knowing a medical doctor; and health care quality issues [22-26]. In Nepal, health care-seeking behaviors for childhood illnesses are known to be associated with the number of symptoms, caregiver's level of education, family income [27], child's gender [28], and cost of health care [29]. CHW activities and education programs, meanwhile, have improved caregivers' care-seeking behaviors [30]. Providing antenatal health education packages through FCHVs has also shown positive results in increasing caregivers' health care-seeking behaviors, service utilization, and recognition of danger signs [31]. Such findings suggest that FCHV programs can be effective for improving health care-seeking behaviors for childhood illnesses.

Yet few studies have focused on current status and the determinants of caregivers' FCHV service utilization in Nepal. Thus, the objectives of this study were 1) to examine current status of FCHV service utilization, and 2) to identify the determinants of caregivers' utilization of FCHVs' services for their children's illnesses, in the mid-western region of Nepal, one of the most remote and economically depressed areas of the country.

Methods

This cross-sectional study was conducted in June 2012, in three Village Development Committees (VDCs, the smallest political unit in Nepal) of three different districts located in the mid-western hill region of Nepal: Bijayshwari VDC (Rukum district), Kalagaun VDC (Salyan district), and Jagatipur VDC (Jajarkot district). The three VDCs and districts were purposively selected for the study sites based on the following three characteristics: 1) rural mountainous areas with limited transportation, but accessible by car or plane; 2) high numbers of childhood illness cases reported in Bijayshwari VDC (the second highest cases in the Rukum district) and Jagatipur district (the third highest cases within Jajarkot VDC) in 2011; and 3) technical support was available from the Chaurjahari mission hospital, which is located at the boundary of the three VDCs.

Participants in this study were the primary caregivers of children under five years of age who had ever been ill by the time of data collection. Among those participants, we also asked recent health service utilization for the primary caregivers of children under five years of age who had been ill during the past seven months. Primary caregivers were excluded from the study if they were under the age of 18 years or had serious physical or mental disability.

Sample size was calculated based on an estimated rate of utilization of FCHVs' services for any childhood illness. The required sample size was calculated to be 240, to attain 80% power with alpha set at 0.05 for a two-tailed test. However, to counteract the effect of missing data, data were collected from 450 households.

A two-stage random sampling method was adopted. First, three wards from nine wards in each VDC were selected randomly. After selecting these wards, a name list was made of households with children under five years based on VDC name lists. Data collectors visited every household to verify which households had children under five years. From three wards of each VDC, 150 participants were randomly selected from the list. The number of participants from each ward was adjusted proportional to the total number of households therein because the number of households varied among wards. In Jagatipur VDC, however, the total household number in the selected wards was only 155, so we included every household in the study.

Data collection procedures

In total, 455 caregivers were selected for the survey. Among them, 451 caregivers agreed to participate in the survey, but five caregivers were excluded as their children had never been ill in their lifetime, resulting in 446 participants. Out of 446 participants, 316 had children who had fallen ill within the last 7 months. These 316 participants were analyzed for health service utilization, while a total of 446 participants were analyzed for FCHV service utilization.

Primary caregivers were interviewed for approximately 40 minutes using a structured questionnaire administered by trained interviewers in the Nepali language. To this end, VDC secretaries or FCHVs were asked to invite the primary caregivers of children under five years of age to public places such as schools, where interviewers then conducted face-to-face interviews.

If a primary caregiver had more than one child under five years of age, the caregiver was asked specifically about the child who had experienced an illness most recently. If no child had fallen ill within the seven months, the youngest child was designated as the focus of the interview questions.

Measurements

The questionnaire [Additional file 1] was adapted from the Nepal DHS questionnaire [10], IMCI Household Survey

questionnaire [32], and Nepal Family Health Program survey questionnaires [19,33]. Items elicited information on health service utilization for childhood illness including utilization of FCHVs' services, knowledge of danger signs of childhood illness, usual health practices for childhood illness and socio-demographic characteristics.

Utilization of FCHVs' services

Caregivers were asked if they had visited an FCHV for treatment of their child's illness, especially for ARI or diarrhea [10]. If caregivers' answer were yes, they were categorized as "FCHVs' service user". In addition, caregivers were asked if they were aware of their ward's FCHVs' other services. FCHVs' services in our survey included providing health information through mothers' groups, advice to pregnant women, advice to postpartum mothers, advice regarding newborn care, condom and pill supplies, vitamin A for mother and child, and information on human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) and other sexually transmitted infections (STIs) [19,33].

Usual health practices for childhood illness

Caregivers were asked about their usual health practices for their children's illnesses, including usual care seeking behavior, knowledge of danger signs, distance to health services, and cost of health services. Regarding the health costs, caregivers were asked if they could usually afford the costs of health care. For the distances, they were asked how long it takes to get from their house to each health service provider [32].

Health service utilization for childhood illness

Caregivers were asked regarding their actual practices in seeking health services in response to their children's illnesses. First, they were asked if their children fell ill after Dashain, one of the biggest festivals in Nepal, which took place seven months prior to the time of survey. If the answer was yes, they were also asked from where and whom they had sought treatment [32].

Socio-demographic characteristics

Socio-demographic characteristics were assessed using items from the DHS Household, Women's, and Men's Questionnaires, which include items on age, sex, education, ethnicity, religion, and family structure elements such as child's age and gender [10]. For ethnicity, participants were classified into three broad categories: upper caste (Brahmin/Chhetri/Jogi), indigenous ethnic groups (Janajati), and lower caste (Dalit).

Economic status of households was assessed by a weighted wealth index adopted from the 2011 Nepal DHS. The index incorporated information on roofing materials, ownership of agricultural land, livestock ownership, and

ownership of household assets including televisions, radios, clocks, fans, mobile phones, and dhiki (traditional wooden thresher) [8]. The variables were dichotomized and principal component analysis used as item weights that were summed to generate a wealth index. The total weighted wealth index score was subsequently divided into three categories: 40% "poor", 40% "middle", and 20% "rich" [34].

Data analysis

We compared socio-demographic characteristics along with knowledge-, health-, and FCHV-related variables between caregivers who had ever used FCHVs' services and those who never used FCHVs' services. Health service providers were categorized into three groups: health facilities, pharmacies, or FCHVs. Health facilities encompassed private hospitals, public hospitals, and health posts (or sub-health posts).

Chi-square or Fisher's exact test were applied to test the significant differences as appropriate. In addition, multiple logistic regression analysis was conducted to examine determinants of utilization of FCHVs' services for childhood illness. We controlled for economic status, number of family members, living with grandparents, caregivers' age, literate ability, caste, able to pay the cost of health care, autonomy for health service utilization, past experience for mothers' group participation, time to FCHV's residence, time to any health facilities, and satisfaction with FCHVs' services. Multicollinearity was also checked by examining Spearman's correlation coefficient, and groups of correlated variables were defined using an absolute rho value = 0.5 or more.

For all procedures, statistical significance was set at p -value less than 0.05. Statistical analysis was performed using the Stata Special Edition 11.2 software package (StataCorp, College Station, Texas, USA).

Ethical considerations

Ethical approval was obtained from the Nepal Health Research Council (NHRC) and the Research Ethics Committee of the Graduate School of Medicine, the University of Tokyo. Primary caregivers participated voluntarily, and the confidentiality of their answers was maintained throughout the survey. Before administering the interview, informed consent was obtained in written form from all participants and with thumbprints from those who were illiterate.

Results

Differences in characteristics between FCHVs' services users and non-users

Out of 446 participants, almost all primary caregivers were mothers (94.2%), married (98.0%), and believed in the Hindu religion (97.3%). The mean numbers of their

family members and children were 5.5 (standard deviation [SD] 1.8, 95% CI = 3-9) and 2.5 (SD 1.3, 95% CI = 1-7), respectively. Mean age of participants was 26.9 (SD 8.4, 95% CI = 18-65) years old; 61% had no formal schooling (N = 268) and 34.3% were illiterate (N = 153; Table 1). Among participants, 66.8% had never utilized FCHVs' services for their children's illnesses in their lifetime.

No significant difference was detected in socio-demographic characteristics between caregivers who had ever used FCHVs' services and those who had never used such services. However, FCHVs' services users' autonomy for decision making and affordability were significantly lower compared to non-users'. A significantly lower percentage of FCHVs' services users could decide to go to a health facility of their own independent accord (84.5% vs. 93.6%, $p = 0.002$). Also, they were less frequently able to cover health care costs compared to non-users (73.7% among FCHVs' services users vs. 92.6% among non-users, $p < 0.001$).

FCHVs' services users tended to spend less time to reach health services compared with non-users. Also relative to non-users, a significantly higher percentage of FCHVs' services users had used a private hospital (42.6% vs. 24.2%, $p < 0.001$), health post (29.7% vs. 21.5%, $p < 0.001$), or pharmacy (64.2% vs. 50.7%, $p = 0.026$) within one hour of their residences. Moreover, a higher percentage of FCHVs' services users lived within a 10-minute walk of an FCHV's residence compared to non-users (52.0% vs. 28.9%, $p < 0.001$).

About half of caregivers were not aware of FCHVs' services, and about one-third of caregivers received services from FCHVs (Table 2). The vitamin A program is an exception, with 90% of both users and non-users receiving vitamin A from FCHVs. FCHVs' services users exhibited a significantly higher percentage of FCHVs' services awareness, service utilization, and FCHVs' services satisfaction. Significantly higher percentage of FCHVs' services users were extremely satisfied with FCHVs' services compared to non-users (33.1% vs. 20.1%, $p < 0.001$).

Factors associated with utilization of FCHVs' services for childhood illness

Multiple logistic regression analysis was used to analyze factors associated with utilization of FCHVs' services (Table 3). Children who lived with grandparents were 52% less likely to have consulted FCHVs (95% CI = 0.27-0.86). Likewise, participants who were able to cover health care costs and who had autonomy in child health matters were 76% (95% CI = 0.12-0.46) and 58% (95% CI = 0.20-0.89) less likely, respectively, to have used the services of FCHVs. Furthermore, time taken to reach FCHV's residence was also negatively associated with FCHVs' services utilization. Participants who could reach FCHV's residence by walking

Table 1 Socio-demographic characteristics of respondents by FCHVs' services utilization (N = 446)

Variable	FCHVs' service user		Non-user		p-value
	(n = 446)	%	(n = 298)	%	
Number of family members [†]					
3 or 4	46	31.1	92	30.9	0.964
5 or more	102	68.9	206	69.1	
Number of children [†]					
1	39	26.4	85	28.5	0.890
2	39	26.4	76	25.5	
3	70	47.3	137	46.0	
Living with grandparents [†]					
Yes	47	31.8	123	41.3	0.051
Caregiver's age [†]					
< 25	143	48.0	68	46.0	0.684
25 or more	155	52.0	80	54.0	
School education level (no. of years) [†]					
Never attended	81	54.7	187	62.8	0.253
1-5	17	11.5	26	8.7	
6 or more	50	33.8	85	28.5	
Literacy [†]					
Literate	101	68.2	192	64.4	0.424
Illiterate	47	31.8	106	35.6	
Caste [‡]					
Upper caste	93	62.8	205	68.8	0.451
Janajati (indigenous)	11	7.4	18	6.0	
Dalit	44	29.7	75	25.2	
Economic status [†]					
Poor	58	39.2	120	40.3	0.969
Middle	60	40.5	120	40.3	
Rich	30	20.3	58	19.5	
Decision maker about child health care					
Mother can decide [†]	125	84.5	279	93.6	0.002**
Mother-in-law decides [†]	28	18.9	45	15.1	0.515
Able to pay costs for health care [†]					
Yes/Usually	109	73.7	276	92.6	<0.001**
Have health facility within 1 hour walk [†]					
Yes	100	67.6	167	56.0	0.019*
Time to FCHV's house [†]					
Less than 10 minutes	77	52.0	86	28.9	<0.001**
11-30 minutes	49	33.1	118	39.6	
More than 30 minutes	22	14.9	94	31.5	
Have participated in mothers' group [†]	50	33.8	32	10.7	<0.001**

[†], Chi-square test; [‡], Fisher's exact test.
*, p < 0.05; **, p < 0.01.

within 11-30 minutes were 58% less likely (95% CI = 0.25-0.70) to have ever used FCHVs' services, and those who had to walk more than 30 minutes to reach FCHV's

residence were 69% less likely (95% CI = 0.16-0.59) to have ever used FCHVs' services than those who could reach FCHV's residence within just 10 minutes. On the other

Table 2 Respondents' knowledge and utilization of FCHVs' services by FCHVs' services utilization (N = 446)

Variable	FCHVs' services user		Non-user		p-value
	(n = 148)	%	(n = 298)	%	
Knowledge about danger signs					
Fever [†]	135	91.2	281	94.3	0.222
Respiratory symptom [†]	116	78.4	202	67.8	0.020*
Diarrheal symptom [†]	81	54.7	125	41.9	0.011*
Knowledge about FCHV-provided services					
Vitamin A dispensing [†]	139	93.9	273	91.6	0.387
Iron tablet dispensing [†]	94	63.5	137	46.0	<0.001**
Advice for pregnant woman [†]	100	67.6	125	42.0	<0.001**
Advice for post-partum woman [†]	90	60.8	120	40.3	<0.001**
Advice regarding newborn care [†]	82	55.4	107	35.9	<0.001**
Treatment for diarrhea [†]	99	66.9	103	34.6	<0.001**
Condom and pill dispensing [†]	75	50.7	124	41.6	0.070
Treatment for ARI [†]	58	39.2	92	30.8	0.080
Health information [†]	78	52.7	109	36.6	0.001**
HIV/AIDS/STI information [†]	32	21.6	58	19.5	0.593
Services received from FCHV					
Vitamin A dispensing [†]	134	90.5	270	90.6	0.983
Iron tablet dispensing [†]	73	49.3	96	32.2	<0.001**
Advice for pregnant woman [†]	59	39.9	13	4.4	<0.001**
Advice for post-partum woman [†]	48	32.4	8	2.7	<0.001**
Advice regarding newborn care [†]	53	35.8	9	3.0	<0.001**
Condom and pill dispensing [†]	46	31.1	15	5.0	<0.001**
Health information [†]	34	23.0	6	2.0	<0.001**
HIV/AIDS/STI information [†]	23	15.5	6	2.0	<0.001**
Satisfaction with FCHVs' services [†]					
Extremely satisfied	49	33.1	60	20.1	<0.001**
Generally satisfied	95	64.2	178	59.7	
Not satisfied	4	2.7	49	16.4	
Never met FCHV	0	0.0	11	3.7	
Things that need to be improved about FCHVs' services					
Medicine availability [†]	99	66.9	182	61.1	0.472
Service quality [†]	50	33.8	87	29.2	0.460
Interpersonal manners [†]	23	15.5	79	26.5	0.005**
Access [†]	33	22.3	65	21.8	0.934
Health advice [†]	7	4.7	12	4.0	0.807

[†], Chi-square test; [‡], Fisher's exact test.

*, p < 0.05; **, p < 0.01.

hand, participants who had ever participated in a mothers' group were 3.2 times more likely to have used FCHVs' services (95% CI = 1.81-5.76).

Caregivers' recent care seeking behaviors for childhood illness

Among 446 children, 316 experienced any illness during the past seven months. Their reported common symptoms were fever (82.3%), respiratory symptoms (73.7%),

and diarrheal symptoms (41.8%). About one-third (32.3%) of caregivers recognized more than three of these symptoms, and 52.5% recognized their children's illnesses as severe.

Of those 316 children who had fallen ill in the last seven months, seven children did not visit any health service provider for treatment. Of the remaining 309 children who did seek treatment, 36 (11.7%) went to a health facility, 249 (80.6%) visited a pharmacy, and 23

Table 3 Association between selected socio-demographic factors and FCHVs' services utilization (N = 446)

Variable	AOR	95% CI	
		Lower	Upper
Economic status			
Poor			
Middle	1.19	0.68	2.06
Rich	1.52	0.76	3.04
Number of family members			
3 or 4			
5 or more	1.38	0.77	2.47
Living with grandparents	0.48*	0.27	0.86
Caregiver's age			
25 or more			
Less than 25	1.14	0.69	1.90
Literate	1.04	0.81	1.33
Caste			
Upper caste			
Dalit	1.27	0.73	2.19
Janajati (indigenous)	1.19	0.48	2.91
Able to pay the cost of health care			
Always/usually	0.24**	0.12	0.46
Mother can decide to use health service			
Yes	0.42*	0.20	0.89
Have participated in mothers' group			
Yes	3.23**	1.81	5.76
Time to FCHV's residence			
Less than 10 minutes			
11-30 minutes	0.42*	0.25	0.70
More than 30 minutes	0.31**	0.16	0.59
Have health facility within one hour's walk			
Yes	1.63	0.99	2.68
Satisfaction with FCHVs' services			
Generally satisfied/not satisfied			
Extremely satisfied	1.55	0.93	2.57

*, p < 0.05; **, p < 0.01.

(7.4%) consulted a FCHV (Table 4). Seventy-four caregivers (23.4%) took their child to more than one health service provider, and 13 (4.1%) of them went to three providers. FCHVs, where consulted, were always consulted as the first-choice health service provider, and all FCHVs' services users also visited at least one other provider. Among caregivers who did not visit FCHVs for their children's illness during the last seven months (n = 293), two major reasons for not using FCHVs' services were "FCHVs often did not have medicine" (55.4%) and "FCHVs were not competent" (26.3%).

Discussion

This study showed that caregivers underutilized health services of FCHVs when their children suffered from illness in the study region. Major factors for the low utilization were lack of medicine with FCHV, perceived incompetency of FCHVs to provide services, and lack of awareness about FCHVs' services. The study also suggested

that FCHVs' services were underutilized for other services in pregnancy, delivery, and postpartum and newborn care. However, caregivers' participation in mothers' groups was positively associated with their utilization of FCHVs' services.

Most caregivers did not visit FCHVs for their children's illness in the study site. Only 33% of caregivers had ever utilized FCHVs' services in their lifetime, and less than 10% of caregivers utilized FCHVs' services when their children had fallen ill during the past seven months. Underutilization of FCHVs' child health program was consistent with previous DHS data [8], but caregivers' awareness about FCHVs' services was much lower in this study than indicated in the previous national study [19]. Possible reasons for underutilization of FCHVs' services include caregivers' lack of awareness about FCHVs' services, lack of medicine with FCHVs, and easy access to pharmacies, from which caregivers could obtain a variety of medicines and advice.

Table 4 Health service utilization and satisfaction among caregivers of children who had fallen ill during the last 7 months (n = 316)

Variable	Health facility		Pharmacy		FCHV		p-value
	(n = 36)	%	(n = 249)	%	(n = 23)	%	
Satisfaction with first-choice health service provider [†]							
Extremely satisfied	13	36.1	109	43.8	2	8.7	0.008**
Generally satisfied	21	58.3	128	51.4	19	82.6	
Not satisfied	2	5.6	12	4.8	2	8.7	
Visited second-choice health service provider [†]							
Yes	19	54.8	31	14.2	23	100.0	<0.001**
Reason for not visiting FCHV							
FCHV had no medicine [†]	18	50.0	155	62.3			0.160
FCHV was not competent [†]	17	47.2	64	25.7			0.007**
Distance [†]	7	19.4	41	16.5			0.091
Did not know FCHV providing treatment [†]	1	2.8	6	2.4			1.000
Benefit of getting treatment from FCHVs							
Saves time [†]	14	38.9	73	29.3	10	43.5	0.224
Able to acquire medicine [†]	3	8.3	24	10.7	7	30.4	0.015*
Free of cost [†]	1	2.8	13	5.2	2	8.7	0.620

[†], Chi-square test; [‡], Fisher's exact test.

*, p < 0.05; **, p < 0.01.

Medicine availability was the main concern for caregivers. More than 50% of caregivers answered lack of medicine was the reason not to visit FCHVs. Also, about 65% of caregivers pointed out medicine availability should be improved in FCHVs' services. Although medicines were supplied to FCHVs through health posts, the supply was frequently delayed, which often led to shortages of medicines and other commodities at FCHVs [35-37]. If the district and VDC could procure and supply drugs promptly, FCHVs' services might be more widely utilized by caregivers in Nepal.

Many caregivers also claimed that FCHVs skill, knowledge, and attitude were not friendly to the client. Notably, 31.5% and 23.5% of caregivers raised FCHVs' inefficient service quality and FCHVs' lack of interpersonal manners as their primary concern, respectively. These were also claimed in the past as reasons for not using FCHVs' services [19]. The low satisfaction with FCHVs' services might have reflected caregivers' evaluations of FCHVs' insufficient capability. Providing additional and ongoing training for FCHVs might help to improve their competence, increase satisfaction with their health services among caregivers, and thus increase the utilization of their services. Previous research conducted in the eastern region of Nepal reported that FCHVs were able to acquire more knowledge and skills on several neonatal health services by attending additional training [16]. Another study conducted in the same region reported that caregivers were more likely to

have visited FCHVs for child health consultations after attending education programs provided by FCHVs and other health personnel [38]. Such findings suggest that providing better and further training for FCHVs would improve their skills along with caregivers' care seeking behaviors.

Only the vitamin A program was well recognized among caregivers as one of the health services offered by FCHVs. While only about a third of caregivers had ever used FCHVs' services for their children's illnesses, 90% of caregivers had used the vitamin A program. The Nepal National Vitamin A Program (NVAP) was expanded nationwide in 2002 and is now widely recognized among caregivers because of the government's promotion efforts. This program can serve as a model for CB-IMCI program to increase awareness about their initiatives and promote utilization of FCHVs among caregivers. In the NVAP program, vitamin A capsules are provided in every six months to children aged 6-59 months through FCHVs [31,35,36]. NVAP uses mass media to promote the program and to have FCHVs deliver information to residents in their communities regarding time and location of the vitamin A distribution campaigns [37]. Such an active promotion of CB-IMCI programs could similarly encourage caregivers to utilize FCHVs' services for childhood illness management.

Caregivers' participation in mothers' groups had a strong impact on FCHVs' services utilization. Mothers' groups are comprised of local women of reproductive

age and promote cultural, income-generating, and health promotion programs within their own communities. As members of the mothers' group, FCHVs play an important role in motivating and educating local mothers and community members. Through a mothers' group, caregivers will get information about health issue and available health services from FCHVs. However, mothers' group participation rates were not high in the study site - only 18.4% of all caregivers had ever participated. Encouraging caregivers to participate in a mothers' group may be effective to increase utilization of FCHVs' services and caregivers' awareness of FCHVs' services.

In Nepal, FCHVs' service quality was not at a sufficient level in many communities [36,38]. Additional training should be provided to FCHVs, to improve the quality of their services and the maternal and child health status of the region. This is because knowledgeable FCHVs can attract the larger numbers of caregivers who consult FCHVs for ARI [39]. FCHVs' services might be effectively expanded through training. To strengthen communities' health services, it would be ideal to train FCHVs to promote and provide CB-IMCI services more effectively.

The study results need to be interpreted in light of certain limitations. First, reporting and recall biases might have occurred because we relied on respondents' self-report about their children's illnesses during the past seven months. However, attempts were made to minimize these potential biases by pre-testing the questionnaire and training interviewers. Also, we used the Nepali calendar and set the reference point for retrospective recollection to fall just after the major Nepali festival of Dashain in order to stimulate participants' memories. Second, it may be difficult to generalize the study results nationwide because the study districts were chosen purposively.

Despite these limitations, this is one of the few studies to describe how health services are being utilized for childhood illness, including determinants for utilization of FCHVs' services in the mid-western region of Nepal. In addition, to the best of our knowledge, no other studies have highlighted underutilization of FCHVs' services in rural areas after the CB-IMCI program's introduction, though FCHVs have since spread throughout the country.

Conclusions

Caregivers underutilizes FCHVs' treatment services of childhood illnesses in rural Nepal. The main reasons for such underutilization are found both among service providers and users; 1) medicines were not available through FCHVs' services, 2) FCHVs were not competent, and 3) caregivers are not aware of FCHVs' services. Appropriate training is needed for FCHVs but awareness raising is also necessary for caregivers to improve health services. This should be accompanied by training service providers in

interpersonal relations and an assurance of regular supply of medicines to FCHVs so that when caregivers decide to seek care the service is readily available.

Additional file

Additional file 1: Survey questionnaire.

Abbreviations

ADD: Acute Diarrheal Disease; ARI: Acute Respiratory Infection; CB-IMCI: Community-based Integrated Management of Childhood Illness; CHW: Community Health Workers; DHS: Demographic and Health Survey; FCHV: Female Community Health Volunteer; NVAP: Nepal Vitamin A Program; ORS: Oral Rehydration Salts; UNICEF: The United Nations Children's Fund; VDC: Village Development Committee; WHO: World Health Organization.

Competing interests

The authors declare no competing interests. This study was funded by the Ministry of Health, Labor and Welfare of Japan (Research Grant No.: H24-Chikyukibo-Ippan-008).

Authors' contributions

MM contributed to the study design, data collection, analysis, and write-up. JY and MJ provided the overall supervision of this study, from its inception to its conclusion. AKP and RCS participated in its design and coordination. All authors read and approved the final manuscript.

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Author details

¹Department of Community and Global Health, the University of Tokyo, Tokyo, Japan. ²Department of Community Medicine and Public Health, Tribhuvan University, Kathmandu, Nepal. ³Green Tara (NGO), Kathmandu, Nepal.

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Caregivers' treatment-seeking behaviour for children under age five in malaria-endemic areas of rural Myanmar: a cross-sectional study

Moe Moe Thandar¹, Myat Phone Kyaw², Masamine Jimba¹ and Junko Yasuoka^{1*}

Abstract

Background: A community-based malaria intervention was introduced through fixed and mobile clinics in rural Myanmar. This study attempted to identify treatment-seeking behaviour of caregivers for children under five and the determinants of appropriate treatment-seeking behaviour in mobile clinic villages (MV) and non-mobile clinic villages (NMV) in malaria-endemic rural areas in Myanmar.

Methods: A cross-sectional study was conducted in 23 MV and 25 NMV in Inga Township, Myanmar. Appropriate treatment-seeking behaviour was operationally defined as seeking treatment from trained personnel or at a health facility within 24 hours after the onset of fever. Multiple logistic regression analyses were conducted to identify the determinants of appropriate treatment-seeking behaviour.

Results: Among the 597 participants in both types of villages, 166 (35.3%) caregivers sought appropriate treatment. No significant difference in appropriate treatment-seeking behaviour was found between the two types of villages (adjusted odds ratio (AOR), 0.80; 95% confidence interval (CI), 0.51-1.24). Determinants of behaviour include proximity to public health facilities (AOR, 5.86; 95% CI, 3.43-10.02), knowledge of malaria (AOR, 1.90; 95% CI, 1.14-3.17), malaria prevention behaviour (AOR, 1.76; 95% CI, 1.13-2.76), treatment at home (AOR, 0.26; 95% CI, 0.15-0.45), and treatment and transportation costs (AOR, 0.52; 95% CI, 0.33-0.83).

Conclusions: Caregivers' treatment-seeking behaviour was poor for fever cases among children under age five, and did not differ significantly between MV and NMV. It is necessary to educate caregivers, particularly for early treatment seeking and appropriate use of health care options for fever, and catering to their medical needs. These findings can help promote awareness and prevention, and improve the quality of interventions at the community level.

Keywords: Malaria, Treatment-seeking behaviour, Children under age five, Myanmar

Background

Malaria is a major health issue in several tropical and sub-tropical countries [1]. In 2012, there were an estimated 207 million malaria cases and 627,000 malaria deaths, of which 77% of deaths were children under age five [2]. However, malaria mortality has decreased by more than 25% since 2000 due to extensive prevention and control measures [3]. Appropriate malaria treatment administered within 24 hours after the onset of fever can help lower it further [4].

Although malaria is typically treated at health facilities, diagnosis and treatment at community level is effective when access to such facilities is limited. The effectiveness of community-level malaria control measures is influenced by early recognition of symptoms and subsequent treatment-seeking behaviour [5]. It is therefore crucial to obtain region-specific information on treatment-seeking behaviour for malaria, the use of anti-malarial drugs, and obstacles to treatment [6,7].

Malaria treatment-seeking behaviours are also associated with socio-economic, demographic and personal factors. Other important factors are proximity to health facilities, availability of transportation, knowledge of malaria, a history of malaria, cultural beliefs regarding

* Correspondence: jyasuoka@post.harvard.edu

¹Community and Global Health Department, Graduate School of Medicine, the University of Tokyo, Tokyo, Japan

Full list of author information is available at the end of the article

traditional and herbal medicines, satisfaction with health services, and attitude towards health care providers [1,8-13].

In Myanmar, malaria is of national concern. Approximately 63% of the country's population lives in malaria-affected areas. Three major post-natal causes of deaths among one- to 59-months-old children are pneumonia, diarrhoea and malaria [14]. Over the past 20 years, the National Malaria Control Programme (NMCP) has made considerable progress in malaria control. Yet the proportion of under-five children who received anti-malarial drugs was well below 60%, and the proportion of under-five children sleeping under insecticide-treated nets was less than 40% in 2008 [15].

Data on malaria-related treatment-seeking behaviours are limited [12]; the only available data found that self-treatment and seeking assistance from drug vendors were the most common practices in Teikkyi township and Shan Special Region II [12,16]; and in the China-Myanmar border area, only 32.0% of malaria patients sought treatment within 24 hours and 20.1% were tested for confirming diagnosis [12].

A Myanmar Medical Association-Malaria (MMA-Malaria) project has been implementing a community-based malaria control programme that promotes the rational use of government-recommended anti-malarial drugs and rapid diagnostic tests (RDT). It also introduces fixed and mobile clinics, and recruits village malaria volunteers in malaria-endemic townships for diagnosis and treatment.

However, little is known about treatment-seeking behaviour after introducing this malaria control programme in communities. To evaluate such control programmes, it is critical to obtain baseline information at the initial stages of programme implementation. Therefore, this study attempted to identify caregivers' treatment-seeking behaviour for children under five and determinants of appropriate treatment-seeking behaviour in mobile clinic villages (MV) and non-mobile clinic villages (NMV) in malaria-endemic rural areas in Myanmar.

Methods

Study area

This cross-sectional study was conducted in Ingapu Township, Ayeyarwaddy region, Myanmar. Of 213,064 residents in the township, 22,790 are children under age five. Thirty-one per cent of the total population in Ingapu Township is at high risk for malaria [17]. Malaria morbidity was 16.78 per 1,000 individuals and mortality was 3.75 per 100,000 cases in 2011. The MMA-Malaria project has conducted a malaria control programme through fixed and mobile clinics and village volunteers in this township since 2012. One fixed clinic is located at Kwin Kaut town and 34 malaria-endemic villages were

selected for mobile clinic visits based on malaria incidences and accessibility. One volunteer in each selected village was recruited for the period between the mobile clinic visits. The mobile team and volunteers provided malaria diagnosis and treatment, and confirmed malaria patients were provided with malaria-related health education by using pamphlets and long-lasting insecticide nets (LLIN). These activities were gradually expanded to 34 villages by June 2013.

Sampling method

Of the 34 malaria-endemic villages where the MMA-Malaria project intervention was introduced, 23 MV were randomly selected for the study. Out of 225 malaria-endemic villages without MMA-Malaria project intervention, 25 non-intervention villages were selected as a comparison group (NMV), ensuring similarity in residents' demographics, socio-economic status, geographical location, and proximity to fixed clinics. Villages with rural health centres (RHCs) were excluded. Depending on the population of the village (150–500 residents), approximately 12 participants from each village were selected.

Participants

Study participants were caregivers of children under five years who had a history of fever during the two months preceding the study. Caregivers were mothers or other family members who were most responsible for attending to their child's health. Caregivers younger than 18 years and those with mental health problems were excluded. Further, those whose children were ill at the time of the interview were also excluded, as they were likely to seek health care until the child was cured. In high-risk areas, malaria is suspected in every fever case. Therefore, in this study seeking treatment within 24 hours after the fever was set as the indicator of appropriate treatment-seeking behaviour [12,13].

Sample size calculation

The sample size was calculated using Epi Info 7 (Centers for Disease Control and Prevention, Atlanta, Georgia). The test's power was 80% with a 95% confidence interval. Due to limited data about treatment-seeking behaviour for children under five, the prevalence of the dependent variable was estimated to be 70% for this study, based on a previous study in Bago Region in Myanmar [18]. This resulted in a minimum sample size of 246 participants in one group. To compensate for missing responses, at least 300 participants for each group were recruited in this study.

Measurements and variables

A structured questionnaire was developed based on the WHO Malaria Indicator Survey tool [19] and relevant studies [20-23]. The questionnaire was first developed in

English, translated into Myanmar language, and translated back into English by experts on public health and malaria in Myanmar. The questionnaire was pre-tested in a village with comparable proximity and demographic distribution to the selected villages before finalizing the instrument for data collection. The questionnaire contained four major domains: socio-demographic characteristics, knowledge of malaria, malaria prevention behaviour, and malaria treatment-seeking behaviour.

Outcome variables

The outcome variable was appropriate treatment-seeking behaviour, operationally defined as seeking treatment from trained personnel or at a health facility within 24 hours of the onset of fever [24]. In this study, the first treatment source sought by caregivers was examined if it was trained personnel or health facility. If not, the treatment-seeking behaviour was considered inappropriate.

Independent variables

Socio-economic and personal factors are known to influence treatment-seeking behaviour. The following were included as independent variables: participants' age, sex [12], level of education, occupation [1,9,10], income [1,12], proximity to public health services [1], knowledge of malaria [9], prevention behaviour [20] and type of village (MV or NMV).

Knowledge of malaria

Seven components of knowledge about malaria were measured: symptoms, cause, vulnerable groups, prevention, diagnosis, treatment, and government recommended medication. Each component was assessed by multiple-choice questions, awarded one point for each correct answer. The scores for each component were summed to yield the total knowledge index. The knowledge index scores were categorized into a high and low group, using the median [21,22].

Malaria prevention behaviour

Malaria prevention behaviours were measured using a single question with multiple correct choices. Each malaria prevention measure that the participant selected was awarded one point and the total score was summed. The final scores were categorized into a high and low group, using the median [22].

Data collection

Data were collected in the monsoon season when malaria transmission is high, from August to September 2013. The lead researcher and three trained interviewers conducted face-to-face interviews for about 30 minutes. The interviewers informed caregivers about the purpose

and procedure of the research and ensured that confidentiality would be maintained.

In each village, interviewers visited every accessible household to screen them for the study by inquiring whether any children under age five had a history of fever in the previous two months. If there was more than one child with a history of fever in the previous two months, the history of the most recent child was obtained. In total, 302 participants were selected for the survey in MV and 300 participants in NMV.

Data analysis

After data collection, data were coded and entered using EpiData and analysed with SPSS version 16 (SPSS Inc, Chicago, IL, USA). Of the 602 participants, five were under the age of 18 years, therefore data of 597 caregivers were used. Frequencies and proportions were used for descriptive data. Independent t-tests were used to compare age, number of household members, number of children under five, and income. Chi-square test and Fisher's exact test were used to compare the differences in proportions. To represent appropriate treatment-seeking behaviour, the time taken to seek treatment and health service provider sought were combined and then categorized into four groups. The first group comprised caregivers who sought treatment at a health facility or from trained personnel within 24 hours. The second comprised caregivers who sought treatment within 24 hours, but not at a health facility or from trained personnel. The third comprised caregivers who sought treatment at a health facility or from trained personnel, but not within 24 hours. The fourth group comprised caregivers who did not seek treatment at a health facility or from trained personnel, nor sought treatment within 24 hours. The first group was termed 'caregivers with appropriate treatment-seeking behaviour'; the three remaining groups were termed 'caregivers without appropriate treatment-seeking behaviour'.

To examine appropriate treatment-seeking behaviour, all study participants' data were combined and two kinds of analyses were performed. First, descriptive analyses were conducted to examine differences in characteristics of caregivers who demonstrated appropriate treatment-seeking behaviour and those who did not. Second, multiple logistic regression was performed to identify the determinants of appropriate treatment-seeking behaviour. Type of village (MV and NMV) was set as an independent variable in multiple logistic regression analysis. Multicollinearity among independent variables was tested before logistic regression. Potential confounders included level of education, occupation and income. All continuous variables were converted to dichotomous variables for multiple logistic regression analysis using the sample median and statistical significance was set at $p < 0.05$.

Ethical considerations

Ethical approval was obtained from the Research Ethics Committee of the Graduate School of Medicine, the University of Tokyo, Japan, and the Department of Medical Research (Lower Myanmar), Ministry of Health, Yangon, Myanmar. Upon explaining the objectives of the study, written consent was obtained from all respondents and confidentiality was maintained.

Participants' names were not recorded; instead, identification numbers were used. All the information was treated confidentially and only available to those who directly concerned with this research.

Results

Socio-demographic characteristics of participants

In total, 597 caregivers participated in this study (see Table 1). Almost all participants were mothers, married and of Burma ethnicity. Participants' mean age was 31.5 years (range: 18–75 years). The mean age of children under five with a history of fever during the two months before the interview was 27.4 months (range: 2–59 months); 53.1% of the children were boys.

No significant differences between MV and NMV were observed for socio-demographic characteristics, except for occupation, income and nearest health service provider. In MV, 23.5% of residents were forest workers, while 10.1% were forest workers in NMV ($p = 0.001$); 44.1% in MV as opposed to 33.9% in NMV had a monthly income of more than 60US\$ ($p = 0.011$). In both types of villages, the closest health service providers were drug stores (MV 57.5% vs NMV 53.7%), followed by midwives (MV 22.7% vs NMV 20.8%).

Caregivers' treatment-seeking behaviour

In more than 80% of the households mothers were the decision-makers for seeking treatment outside the home in both types of villages (see Table 2). More than 50% of the caregivers did not medicate at home before seeking treatment, and more than 66% sought treatment outside the home in both types of villages. About 90% of the caregivers raised "disease severity" as the most important deciding factor to seek treatment. In both types of villages, more than 50% of the caregivers sought treatment within 24 hours of the onset of fever and was comparative across MV (57%) and NMV (62%).

The most frequented primary health service provider was the midwife (31.9%) for caregivers who sought treatment outside the home in MV ($n = 229$), whereas in NMV ($n = 241$), the drug stores were the most frequented primary source for treatment (27.0%) ($p = 0.041$). Only 2.6% of caregivers sought treatment from mobile clinics or malaria volunteers in MV. Further, 49.3% of caregivers took longer than 15 minutes to reach the first source for treatment in MV as opposed to 39.0% in NMV ($p = 0.024$).

Table 1 Socio-demographic characteristics of participants

Variables	MV (n = 299)		NMV (n = 298)		p value
	n	%	n	%	
Number of household members					
≤ 4	183	61.2	183	61.4	0.959
> 4	116	38.8	115	38.6	
Number of children U5 at home					
1	271	90.6	265	88.9	0.491
> 1	28	9.4	33	11.1	
Children's age (months)					
≤ 27	158	52.8	159	53.4	0.900
> 27	141	47.2	139	46.6	
Children's sex					
Male	156	52.2	161	54.0	0.650
Female	143	47.8	137	46.0	
Caregivers' age (years)					
≤ 30	170	56.9	155	52.0	0.235
> 30	129	43.1	143	48.0	
Relationship to child					
Mother	271	90.6	270	90.6	0.989
Other	28	9.4	28	9.4	
Level of education					
Illiterate	22	7.4	21	7.0	0.984
Primary school	209	69.9	208	69.8	
Secondary school or higher	68	22.7	69	23.2	
Occupation					
Farmer	116	38.9	123	41.4	0.001
Forest worker	70	23.5	30	10.1	
Other	112	37.6	144	48.5	
Income (US\$)					
≤ 60	165	55.9	197	66.1	0.011
> 60	130	44.1	101	33.9	
Nearest health service*					
Drug store	172	57.5	160	53.7	<0.001
Midwife	68	22.7	62	20.8	
Charlatan/traditional healer	29	9.7	35	11.7	
Malaria volunteer	17	5.7	0	0.0	
Rural health centre	9	3.0	31	10.4	
General practitioner	4	1.3	10	3.4	
Mode of transportation					
On foot	260	87.0	149	83.6	0.241
By vehicle	39	13.0	49	16.4	
Duration					
Within 30 min	291	97.3	287	96.3	0.480
More than 30 min	8	2.7	11	3.7	

Notes: MV: Mobile clinic villages; NMV: non-mobile clinic villages; children U5: children under five; Chi-square test p-value (*Fisher's exact test).

Table 2 Caregivers' treatment-seeking behaviour

Variables	MV (n = 299)		NMV (n = 298)		p value
	n	%	n	%	
Decision-maker for seeking treatment					
Mother	246	82.3	251	84.2	0.523
Other	53	17.7	47	15.8	
Deciding factor					
Disease severity	272	91.3	265	88.9	0.337
Other	26	8.7	33	11.1	
Treatment at home					
Yes	127	42.5	115	38.6	0.334
No	172	57.5	183	61.4	
Treatment outside					
Yes	229	76.6	241	80.9	0.201
No	70	5.8	57	19.1	
Reason for not receiving treatment					
Quick recovery	47	67.1	44	77.2	0.211
Other	23	32.9	13	22.8	
Time taken to seek treatment					
Within 24 hours	131	57.2	150	62.2	0.441
Other	98	42.8	91	37.8	
Primary health service provider*					
Midwife	73	31.9	58	24.1	0.041
GP	62	27.1	62	25.7	
Drug store	55	24.0	65	27.0	
Charlatan/traditional healer	15	6.6	20	8.3	
RHC	14	6.1	31	12.9	
Malaria volunteer/mobile clinic	6	2.6	1	0.4	
Hospital	4	1.7	4	1.7	
Reason for choosing primary health service					
Trust	111	48.5	117	48.5	0.097
Proximity	64	27.9	54	22.4	
Other	28	12.3	41	17.0	
Famous	10	4.4	5	2.1	
Inexpensive	16	7.0	24	10.0	
Mode of transportation					
On foot	108	47.2	119	49.4	0.807
Motorbike	68	29.7	72	29.9	
Other	53	23.1	50	20.7	
Blood test					
Yes	17	7.4	16	6.6	0.739
No	212	92.6	225	93.4	
Location where blood test was conducted*					
Midwife	5	29.4	6	37.5	0.230
GP	7	41.2	3	18.8	

Table 2 Caregivers' treatment-seeking behaviour (Continued)

Hospital/RHC	2	11.8	6	37.5	
Malaria volunteer/mobile clinic	3	17.6	1	6.3	
Health education conducted with patient					
Drug timetable	7	87.5	5	100.0	0.411
Drug compliance	7	87.5	5	100.0	0.411
Preparedness for worsened symptoms*	6	75.0	2	40.0	0.293
Follow up*	2	25.0	2	40.0	1.000
Severe malarial symptoms*	2	25.0	1	20.0	1.000
Side effects*	1	12.5	0	0.0	1.000
Total cost (US\$)					
≤ 1.1	111.0	48.5	125	51.9	0.462
> 1.1	118.0	51.5	116	48.1	
Used MMA service					
Yes	52	17.4	32	10.7	0.019
No	247	82.6	266	89.3	

Notes: MV: Mobile clinic villages; NMV: non-mobile clinic villages; GP: general practitioner; RHC: rural health centre; MMA: Myanmar Medical Association; Chi-square test p-value (*Fisher's exact test).

In MV, of the total 229 children who received treatment outside their homes, 17 were tested for malaria; 15 (6.6%) children received a malaria diagnosis using blood tests with RDT, and two children (0.9%) received a diagnosis using microscopy. In NMV, of the total 241 children who received treatment outside home, 16 children were tested for malaria; blood test with RDT were conducted on 15 children (6.2%) and one child (0.4%) received a diagnosis with microscopy. In MV, blood tests were conducted most frequently at general practitioners' (GPs) clinics, while in NMV, public health facilities (midwives, hospitals, and RHCs) were most frequently visited for blood tests. Only five children in MV and three in NMV received positive results for malaria on the blood test.

In both types of villages, 88 caregivers consulted more than one health service provider and 20 caregivers consulted three providers. When mobile clinics and malaria volunteers were sought, they were always the first-choice health service provider (data not shown in Table). Fifty-two caregivers (17.4%) from MV and 32 caregivers (10.7%) from NMV had sought MMA mobile clinics or malaria volunteers at least once ($p = 0.019$).

Caregivers' knowledge of malaria

In both types of villages, more than 85% of the caregivers stated chills and rigor as symptoms of malaria (see Table 3). More than 60% in both types of villages included sweating as a symptom of malaria. About 50% of caregivers in both types of villages were aware that children under five were especially vulnerable to malaria infection and more than 90% knew that mosquito bites cause malaria.

In both types of villages, more than 80% of caregivers answered malaria could be prevented by using mosquito nets or LLIN. Nearly 80% of respondents in both types of villages answered that malaria could be diagnosed by blood tests and over 90% knew that malaria could be treated using anti-malarial drugs. Moreover, 55.0% of caregivers in MV compared to 75.8% in NMV could provide the name of the recommended drug ($p = 0.010$).

Caregivers' malaria prevention behaviour

In both types of villages, the most popular method for malaria prevention, with nearly 100% response rate, was using bed nets (see Table 4). This was followed by avoiding mosquito bites (more than 92%), and wearing long-sleeved shirts and trousers (more than 71%) in both villages. The use of LLIN was low in both types of villages (less than 15%).

Determinants of appropriate treatment-seeking behaviour

Table 5 shows the determinants of appropriate treatment-seeking behaviour. Proximity to public health facilities was positively associated with appropriate treatment-seeking behaviour (adjusted odds ratio (AOR), 5.86; confidence interval (CI), 3.43-10.02). Caregivers who gave their child any medicine at home before seeking treatment outside were less likely to seek appropriate treatment (AOR, 0.26; CI, 0.15-0.45). Caregivers who spent less on treatment and transportation to the nearest health services were less likely to seek appropriate treatment (AOR = 0.52; CI 0.33-0.83). Compared to caregivers who had low levels of knowledge, caregivers with high levels of knowledge were more likely to seek appropriate treatment (AOR = 1.90; CI

Table 3 Caregivers' knowledge of malaria

Variables	MV (n = 299)		NMV (n = 298)		p value
	n	%	n	%	
Symptoms					
Fever (yes)	270	95.4	263	97.4	0.208
Chills and rigors (yes)	248	87.6	255	94.4	0.005
Headache (yes)	211	74.6	215	79.6	0.156
Sweating (yes)	177	62.5	202	74.8	0.002
Vulnerable groups					
Under-five children (yes)	162	57.2	132	48.9	0.049
Pregnant mothers (yes)	139	49.1	116	43.0	0.147
Forest workers (yes)	256	90.5	248	91.9	0.565
Farmers (yes)	170	60.1	150	55.6	0.282
Causes					
Mosquito bite (yes)	279	98.6	256	94.8	0.012
Coughing and sneezing (no)	46	16.3	51	18.9	0.415
Contact (no)	83	29.3	81	30.0	0.863
Drinking (no)	43	15.2	37	13.7	0.618
Bathing (no)	63	22.3	48	17.8	0.188
Eating bananas (no)	74	26.1	63	23.3	0.443
Prevention method					
Use mosquito/bed net (yes)	245	86.6	237	87.8	0.672
Use LLIN (yes)	239	84.5	228	84.4	0.998
Avoid mosquito bites (yes)	235	83.0	234	86.7	0.235
Use mosquito coil (yes)	196	69.3	202	74.8	0.146
Use mosquito repellent (yes)	158	55.8	139	51.5	0.305
Wear long-sleeved clothing (yes)	219	77.4	209	77.4	0.995
Clean environment (yes)	247	87.3	235	87.0	0.932
Cover water containers (yes)	241	85.2	235	87.0	0.524
Diagnosis					
Blood test (yes)	225	79.5	220	81.5	0.558
Fever with chills and rigor (no)	196	37.5	114	42.2	0.252
Observation (no)	26	9.2	22	8.1	0.664
Curable drugs					
Anti-malarials (yes)	169	91.4	165	91.2	0.948
Antibiotics (no)	94	50.8	89	49.2	0.754
Traditional medicine (no)	64	34.6	70	38.7	0.418
Vitamins (no)	83	44.9	99	54.7	0.060
Government recommended drug (Coartem)	44	55.0	47	75.8	0.010

Notes: MV: Mobile clinic villages; VWOMC: non-mobile clinic villages; LLIN: long-lasting insecticide nets; Chi-square test p-value.

1.14-3.17). Similarly, caregivers who had high levels of malaria prevention behaviour were more likely to seek appropriate treatment (AOR = 1.76; CI 1.13-2.76).

Table 4 Caregivers' malaria prevention behaviour

Variables	MV (n = 299)		NMV (n = 298)		p value
	N	%	n	%	
Preventive action					
Using mosquito/bed net	278	98.2	270	100.0	0.028
Avoid mosquito bites	262	92.6	256	94.8	0.281
Wearing long-sleeved clothing	221	78.1	194	71.9	0.090
Using mosquito coil	160	56.5	137	50.7	0.172
Using LLIN	34	12.0	39	14.4	0.399
Using mosquito repellent	10	3.5	14	5.2	0.341

Notes: MV: Mobile clinic villages; NMV: non-mobile clinic villages; LLIN: long-lasting insecticide nets; Chi-square test p-value.

Discussion

This study revealed several important findings regarding caregivers' treatment-seeking behaviour for children under age five in malaria endemic areas of rural Myanmar. First, caregivers' treatment-seeking behaviour was poor; only one-third demonstrated appropriate treatment-seeking behaviour, and the rates of appropriate treatment-seeking behaviour did not differ significantly between MV and NMV. Caregivers' knowledge of malaria, malaria prevention behaviour and proximity to public health service were important determinants of appropriate treatment-seeking behaviour. At the same time, treatment at home and total cost for treatment and transportation were negatively associated with appropriate treatment-seeking behaviour. Midwives played an important role in treatment-seeking behaviour, as most caregivers first approached the local midwife for their child's illnesses.

Only about one-third of caregivers demonstrated appropriate treatment-seeking behaviour. Approximately 20% of the children with fever were not taken to any health services for advice or treatment. This situation appears to be much worse than reported in a study conducted in Wa region in Myanmar, wherein 12.5% of caregivers did not seek treatment for their child's fever [12]. Despite this, the present study found that participants' treatment-seeking behaviour was more favourable than those in several study sites in other countries [7,25-27].

The delay in seeking treatment and the decision to utilize untrained health services are a grievous concern as only about one-third of the caregivers sought treatment for their children at a health facility or from trained personnel within 24 hours of the onset of fever. Another third had consulted with trained personnel or at health facilities but only after 24 hours. A quarter of all caregivers sought treatment within 24 hours, but from untrained health services including drug stores, charlatans and traditional healers; 8.5% sought treatment at untrained health services after 24 hours. A study conducted in India showed that children