

THE ROLES OF WESTERN BIOMEDICINE AND FOLK MEDICINE IN RURAL SOLOMON ISLANDS: A QUANTITATIVE ANALYSIS OF VILLAGERS' RESPONSE TO ILLNESS

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Abstract: This study aimed to explore factors determining treatment-seeking behaviors of villagers in a rural Roviana society of the Solomon Islands. Participants (n = 116) were interviewed every evening for 42 days about the occurrence of illnesses and how they had been treated. The study period was divided into two: 22 days during which a nurse was stationed in the village and 20 days when the nurse was absent. As the results show, nurse's presence had a negative effect on traditional folk medicine use (OR = 0.39, [95% CI: 0.21 0.72]). Fever or headache was treated more preferably with biomedicine (3.82 [1.81 8.07] or 6.75 [2.75 16.55], respectively), whereas *putuputu*, an illness with an indigenous etiology, was treated with the latter (34.7 [3.13 384.41]). In addition, biomedicine was preferably used (7.72 [2.65 22.44]) for the treatment of severe illnesses. While folk medicine was used in 40% of all ill person-days, it has likely been partly displaced by effective Western biomedicine. Still, some folk medicine functioned as a culturally indispensable element in treating indigenous illnesses.

Keywords: Folk medicine, Biomedicine, Medical pluralism, International Health, Roviana, Solomon Islands

INTRODUCTION

Indigenous medical systems, hereafter "folk medicine," have been developed in many societies with markedly different characteristics [1, 2]. Folk medicine has undergone changes since coming under the influence of Europeans who introduced Western medicine and discouraged traditional folk medicine [3, 4, 5, 6, 7, 8, 9, 10]. Previous studies in Oceania have reported the existence of medical pluralism, which is defined as coexistence of different medical systems in a single society [11]. For instance, in Melanesian societies, traditional folk medicine is chosen to cure indigenous illnesses or those thought to have supernatural causes, while Western biomedicine is used to treat introduced illnesses and those with non-supernatural causes [4, 9, 12, 13]. On the other hand, the quantitative analysis on this coexistence is still very limited.

Treatment-seeking behaviors might be determined not only by the illness type but also by individual features such as sex and age, availability of medical infrastructure and ecological resources, modernity, and severity of illnesses [4, 14, 15, 16, 17, 18, 19, 20]. Quantitative analyses taking several different factors into account will be able to detect the determining factors and, therefore, make progress in the debate on how Western biomedicine and folk medicine coexist in a single society.

The purpose of this study was: (1) to explore the role of different types of treatment based on daily records of responses to illnesses; and (2) to clarify which and how different factors affect treatment-seeking behaviors of the villagers in a single rural society of Solomon Islands, an area experiencing the rapid Westernization over the last few decades. Special attention was paid to the effect of the type and severity of illnesses, availability of a biomedical professional, patient's sex and age, and socioeconomic status. Multivariate analyses were applied for detection of determinant factors.

PARTICIPANTS AND METHODS

The permission for research was obtained from the Solomon Islands Government (Minister for Education and Training and Director of Immigration Office). At the community level, the chief and elders also consented to the study. The study was performed according to international, national, and institutional rules and was approved by the Ethics Committee of Graduate School of Medicine, University of Tokyo. All of the data presented in this paper were collected after gaining informed consent from the head and other members of participant households.

Study site

Several traditional practices including herbal treatment and other types of folk medicine are still in widespread use in Solomon Islands [3, 5, 21, 22, 23]. Christian missions initially introduced Western biomedicine and other services, and the government later took over the supply and support of these services [21, 24]. However, their availability is still limited in rural communities. In particular, there is a lack of Western biomedical professionals (e.g., medical doctors and registered nurses) [25]. Registered nurses are not stationed throughout the year in village aidposts, which are the most accessible facilities for the residents of rural areas.

The fieldwork on which this paper is based was conducted from January to October 2001 in Olive village, an inner-Roviana-Lagoon village located in the southern part of New Georgia Island, Western Province. Olive village belongs to Saikile Customary Land, in which four villages and several small hamlets are under the Saikile Paramount Chief today [26, 27]. The inhabitants were 189 males and 158 females belonging to 49 households in February 2001. All villagers were engaged in horticulture of tuberous crops and fishing.

The first Christian mission arrived in Roviana in 1902, and most of the people had been converted by the mid 1920s. Western biomedicine came slowly to inner-Roviana villages including Olive. Establishment of a provincial aidpost equipped with a variety of biomedical drugs opened the way for most villagers to be treated with biomedicine by the 1980s. The nurse, however, did not always stay in the village. For instance, a registered nurse left in November 2000 and another arrived in July 2001. At the time of the study, a small fee (approximately 1 US\$) was required to consult the nurse, although garden crops could be substituted as payment. There was a mission hospital with modern facilities in Munda (about 30 km west of Olive) and a better-equipped national hospital in Gizo, the provincial capital, about 80 km west of the village. Although medical treatment at the two hospitals in the province was free or inexpensive, the villagers seldom visited them because of the difficulty of transportation.

Recording responses to illnesses

For the interview survey concerning treatment of illnesses, 14 households (65 males and 51 females, accounting for 33.4% of the total population) were sampled. The participants included a proportionate number of villagers from each age group and sex. Each member of the participant household (or the parent for small children) was interviewed by the author every evening for 42 days about the occurrence of illness experienced over the past 24-hour period and how it had been treated. It is noted that the daily

interview was advantageous to record all cases however minor (e.g., small wounds) and to avoid dropouts. On occasions where the participant was absent, the interview was conducted the following evening or later.

The names of illnesses reported by the participants were initially recorded in the Roviana language. The author later identified the symptom(s) related to each illness, referring to discussions with a group of healers (*tie sinalana* in Roviana language) comprised of six males and three females. It should be noted that single symptoms (e.g., fever, cut/wound, and cough) or pain/ache in a specific part of body are called a 'simple illness,' while an illness with two or more symptoms included in a name (e.g., malaria) is referred to as a 'complex illness' in this study (see Table 1).

In this paper, both treatment (*sinalana* in Roviana language) and no treatment for an illness are considered a 'response.' The number of person-days during the 42-day period was used as the basic unit of analysis. No nurse was stationed in the village for the first 20 days of the study period, while a nurse was present at the aidpost for the last 22 days. Therefore, the whole study period was divided into two periods.

Responses to an illness could be broadly divided into three categories: (1) Western biomedicine, (2) folk medicine, and (3) no treatment. The Western biomedicine was divided into two subcategories. The first referred to curing behaviors with modern drugs (*meresena vaka* in Roviana language), which had been purchased at stores in town or obtained at the hospital or aidpost in previous cases of illness and kept in the patient's house (hereafter called 'modern drug use'). The second was treatment following consultation with the nurse at the aidpost (*vetu moho*) and using modern drugs (consulting a nurse); some treatment was carried out for every consultation. An important characteristic of consulting a nurse is that modern-drug prescriptions based on Western biomedical standards and injections such as penicillin are available, while biomedical check-ups for malaria and other illnesses, i.e. blood test, were not available at the aidpost. Treatments using folk medicine were also divided into two subcategories. One was the use of herbal medicine (herbal medicine use) and the other was massage (*mono*) including acupressure. It should be noted that the study village also has a tradition of treatment using shells and other faunal resources, but these practices were not observed during the study period.

Interviews on individual and household-level characteristics

Each participant or a parent was asked for his/her age and sex. Male and female household heads (e.g., male head and his spouse and widowed female head and her first son)

Table 1. List of English illness names used in this study and the corresponding Roviana names (asterisk indicates illnesses recognized as fatal or severe)^a

English name	Roviana names
Simple illness	
Chest ache	<i>Sigiti raqaraqqa</i>
Cough	<i>Kohu</i>
Cut/wound	<i>Bakora</i> ^b , <i>poraka</i> [*]
Diarrhea	<i>Malohoro tia</i> ^c , <i>huru</i> [*]
Eye (inflammation)	<i>Mata kare</i>
Fever	<i>Diana (manini)</i> ^d , <i>nunuale</i> [*] , <i>rarabuana</i> [*]
Headache	<i>Sigiti batu</i>
Muscle ache	<i>Sigiti tini</i> ^e , <i>sigiti mudi</i> , <i>sigiti lima</i> , <i>sigiti avara</i>
Rhinitis	<i>Puna</i>
Skin disorder	<i>Moqo</i> ^{f*} , <i>tubu</i> , <i>tini hikare</i>
Sore throat	<i>Sigiti rua</i>
Stomach ache	<i>Sigiti tia</i>
Toothache	<i>Sigiti livo</i>
Vomiting	<i>Lua</i> ^{g*} , <i>iqolo</i> , <i>bekaha</i>
Complex illness	
Illness with imported name	
Malaria	<i>Malaria hokara</i> ^h , <i>malaria tia</i>
Pneumonia	<i>Niumonia</i>
Illness with folk etiology	
N. A.	<i>Putuputu (kolo)</i> , <i>tuku ibibu</i> , <i>lagu hite</i> , <i>popome</i> , <i>mateana tia (tia hikare)</i>

^aClassifications of illness and severity were based on the group discussion of healers (*tie sinalana*).

^b*Bakora* means cut/wound generally, while *poraka* means lacerated wounds recognized by the villagers as severer than the former.

^c*Malohoro tia* is generally referred to as diarrhea, while *huru* means watery, probably bacterial, diarrhea.

^dBoth *diana* (literally 'cold') and *manini* ('hot') refer to the same condition of fever, while *nunuale* refers to shaking chills and *rarabuana* to 'paralysis' recognized by villagers as the result of high fever.

^eAches in whole body (*tini*), arm (*lima*), back (*mudi*), and shoulder (*avara*) were classified as muscle ache.

^f*Tubu* and *tini hikare* refer to pimples and chronic dermatitis, respectively, and *moqo* to inflamed or ulcerated ones.

^g*Lua* refers to vomiting, *iqolo* to nausea and *bekaha* to nausea with abdominal complaints.

^h*Malaria hokara* literally means 'genuine malaria,' while *malaria tia* means 'abdominal malaria.'

were asked about their place of birth, age, education, experience of living in towns, and experience of waged job. To ensure accuracy, both household heads confirmed the information. Dates of births were verified by referring to the written record, or using local history of well-known events such as Independence Day and the date logging operations in this area commenced.

Statistical analyses

Logistic regression analyses were performed so as to determine which factors influenced the villagers' responses to illnesses. Factors included in the models were (A) type of illness, (B) severity: (b1) the number of days counted from the onset of illness and (b2) recognized severity (the name of illness which is recognized as severe = 1, others = 0), (C) availability of nurse (during the period of nurse's presence = 1, during his absence = 0), (D) individual characteristics: (d1) age and (d2) sex, (E) household-level socioeconomic characteristics: (e1) type of house (Western-style permanent house = 1, others = 0), (e2) age, (e3) education history (educated in secondary or higher school = 1, others

= 0), (e4) place of birth (Saikile = 1, others = 0), (e5) experience of living in town (yes = 1, no = 0), and (e6) experience of waged labor (yes = 1, no = 0) of household head.

These procedures were performed using the SAS for Windows version 9.1 (SAS Institute Inc., Cary, NC). A statistically significant association was assumed at $p < 0.05$.

RESULTS

Occurrence of illness

Fifty-eight males (89.2%) and 39 females (76.5%) reported at least one episode of illness during the 42-day period. The total number of person-days in which responses were observed (including "no treatment") was 450 out of 4872 person-days (116 persons times 42 days). Out of the 450, two illnesses were recorded for 131 person-days, and three illnesses were recorded for 21 person-days. No case involved four or more illnesses simultaneously. Most illness episodes ended rapidly; 66.1% of cases occurred in only one day and 89.6% lasted for three days or less. None of the participants visited a hospital in town.

Table 1 shows the illness names in Roviana and the corresponding English names. The latter are sorted by alphabetical order. In total, 33 types of illness were observed, although it should be noted that none were diagnosed with a biomedical check-up. Out of these, 15 illnesses corresponded to single symptoms (i.e., three types of fever, rhinitis, cough or sneeze, three types of vomiting, two types of diarrhea, three types of skin disorders, and two types of cut or wound) and seven to aches (*sigiti* in the Roviana language) in specific parts of the body (e.g., head, stomach, chest, throat, and tooth). Aches in the arm, shoulder, back, and whole body were classified as muscle ache. Roviana names such as *nunuale* or *rarabuana*, *huru*, *lua*, *moqo*, and *poraka* refer to fatal or severe conditions of fever (*diana*), diarrhea (*maloholo tia*), vomiting (*iqolo/bekaha*), skin disorders (*tini hikare/tubu*), and cuts (*bakora*), respectively.

Roviana names, such as *malaria* and *niumonia*, the words for malaria and pneumonia borrowed from English or Pidgin (the lingua franca of the Solomon Islands), were used. *Malaria* consists of two different types: *malaria hokara* (literally, “genuine malaria”) and *malaria tia* (“abdominal malaria”). The former is associated with fever and shaking with chills, whereas the latter does not show a fever symptom but has complicated abdominal disorders diagnosed by palpation. Both illnesses were believed by the villagers to be caused by malaria *nokinoki* (“germs”). *Niumonia* showed fever and respiratory disorders (e.g., cough, chest pain, and sore throat).

It was difficult to determine the English equivalents of five illnesses, i.e., *putuputu*, *tuku ibibu*, *lagu hite*, *popome*, and *mateana tia*, because of their complicated natures. *Putuputu* (also called as *kolo*) showed combined symptoms of abnormal heartbeat, abnormal ventilation, sleep disorder, fatigue, epigastric pain, and nausea. This illness was believed to be caused by problems with blood flow: several re-

spondents said that it was caused by hypertension. *Tuku ibibu* means literally “the pit of the stomach is closed” and features not only pain in the pit of the stomach but also abnormal respiration and anorexia. *Popome* was regarded as an illness in which the lung was rotten or damaged by an ulcer. Both *lagu hite* and *mateana tia* (also called *tia hikare*) were referred to as disorders of the intestinal organs, though the former and latter were usually associated with the appendix and liver, respectively. These five illnesses were categorized as illnesses with indigenous names and etiologies in further analyses of this study.

Patterns of treatment

Figure 1 shows participants’ responses to illnesses by absence (207 person-days) and presence (243 person-days) of the nurse. Throughout the two periods, the most frequent response was modern drug use (45.9% and 38.7% in the absence and presence of nurse, respectively), followed by herbal medicine use (29.0% and 27.8%). Consulting the nurse accounted for 17.8% of person-days during the presence of the nurse. Massage was used in 13.3% and 9.9% of treatment during the absence and presence of nurse, respectively (accompanied by other types of treatment in about a half of cases). No treatment was observed in approximately 18% during both periods. The total frequency of Western biomedicine use (45.9%) and folk medicine use (40.1%) was nearly equal during the period of the nurse’s absence, but the former (51.9%) increased and the latter (32.9%) decreased during the period of the nurse’s presence.

Table 2 shows all illnesses that occurred during the study period. Cases combining two or more illnesses simultaneously were counted for all and those undergoing two types of treatment were also counted for both. Illnesses were sorted by the order of the number of person-days of modern drug use. Three significant observations were made

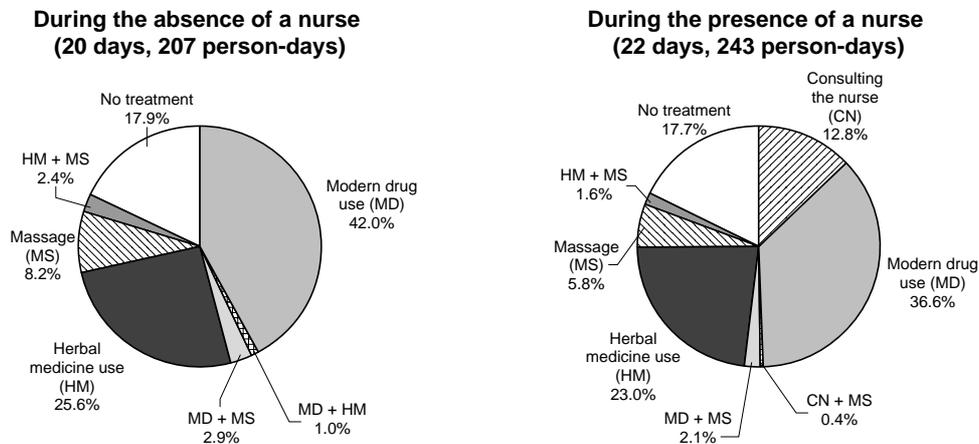


Figure 1. Responses by type of treatment during the period of a nurse’s presence in the village (left) and that of the nurse’s absence (right)

Table 2. Responses to illnesses occurring during the study period^{a, b}

	Western biomedicine			Folk medicine			No treatment	Total
	Modern drug use	Consulting a nurse	Total	Herbal medicine use	Massage	Total		
Simple illness								
Fever	67	8	75	1	9	10	8	93
Headache	48	9	57	0	5	5	8	70
Muscle ache	27	6	33	7	7	14	16	63
Rhinitis	24	2	26	0	2	2	4	32
Cough	23	4	27	6	2	8	3	38
Stomach ache	20	1	21	11	5	16	4	41
Vomiting	12	0	12	5	4	9	2	23
Chest ache	11	2	13	2	3	5	0	18
Toothache	5	0	5	0	0	0	1	6
Cut/wound	5	3	8	20	2	22	19	49
Sore throat	4	2	6	0	5	5	3	14
Diarrhea	4	1	5	5	0	5	1	11
Skin	3	4	7	57	14	71	9	87
Eye	1	1	2	0	0	0	1	3
Complex illness								
Illness with imported name								
<i>Malaria tia</i>	15	0	15	1	1	2	1	18
<i>Malaria hokara</i>	5	2	7	0	0	0	0	7
<i>Niumonia</i>	11	0	11	0	2	2	1	14
Illness with folk etiology								
<i>Lagu hite</i>	4	0	4	1	1	2	0	6
<i>Putuputu</i>	3	0	3	9	7	16	0	19
<i>Tuku ibibu</i>	2	3	5	0	0	0	0	5
<i>Popome</i>	1	0	1	2	0	2	0	3
<i>Mateana tia</i>	0	0	0	4	1	5	0	5
Total	295	48	343	131	70	201	81	625

^aCases where two or more illnesses occurred simultaneously were counted for all and those induced more than one responses were also counted for both.

^bIllnesses were sorted by the order of the number of person-days for modern drug use.

regarding the association between illness and response. First, Western biomedicine, especially modern drug use, was preferred in cases of headache, fever, cough, and rhinitis whereas folk medicine was preferred for skin disorders and wounds. Abdominal pain and diarrhea were treated either with Western biomedicine or folk medicine. Second, illnesses with names and etiologies introduced from abroad (*malaria hokara*, *niumonia*, and *malaria tia*) were treated mainly with Western biomedicine. *Malaria hokara* was treated only with modern drug use. Although not shown in the table, all treatments using herbal medicine or massage as responses to *niumonia* and *malaria tia* were accompanied simultaneously by the use of Western biomedicine. Third, among the illnesses with indigenous names and etiologies, *putuputu*, *popome*, and *mateana tia* were mainly treated by folk medicine and *lagu hite* and *tuku ibibu* by Western biomedicine.

Factors determining an individual's response

Western biomedicine was used in 48.7% and 50.0% of treatments for males and females, respectively, and folk medicine in 36.9% and 34.9%, respectively. 'No treatment' was observed in 17.8% and 18.4% of treatments for males and females, respectively. Overall, there was no association between responses and sex.

Figure 2 shows the responses broken down by age groups (top) and by different days from the onset of illness (bottom). Western biomedicine was used for the treatment of infants, children, and younger adults accounting for approximately 50% of person-days, while the most frequent use was observed in the 30-60 year-old group (64.7%) and the lowest among elders (8.3%). Folk medicine was used most frequently for the treatment of elders (87.5%), followed by that of infants (45.2%), but less in other age groups (range: 23.4 to 29.3%). The proportion of no treatment was low in the age groups of infants and elders who are generally vulnerable to disease.

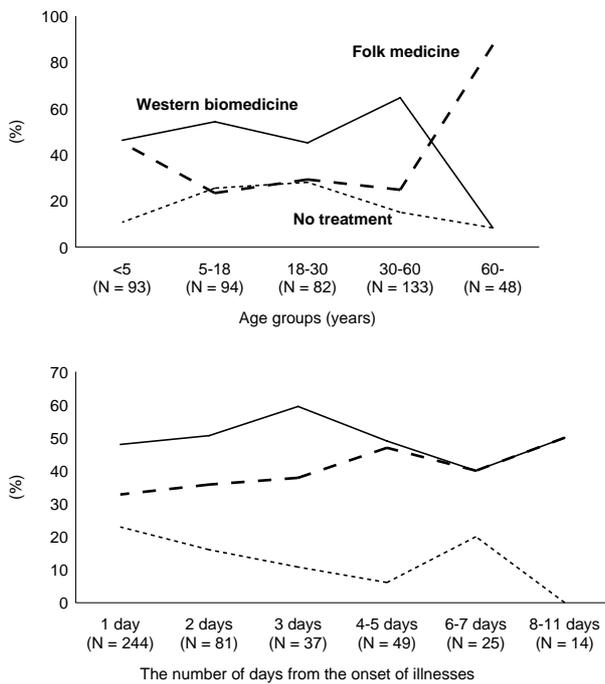


Figure 2. Frequency of response choices in different age groups (top) and different days from the onset of illness (bottom). The number of person-days is shown in parenthesis.

The frequency of Western biomedicine use reached a peak (59.5%) on the third day from the onset of illness, while that of folk medicine use peaked (46.9%) on the fourth day. The frequency of both treatments decreased at the sixth-to-seventh day and then increased again at the eighth-to-eleventh day, and folk medicine was used most frequently (50.0%) in this class of days. The proportion of no treatment was highest on the first day (23.0%) and then constantly decreased, although a second peak (20.0%) appeared at the sixth-to-seventh day.

Logistic regression analysis was used to explore the determining factors for responses as shown in Table 3 (only those factors with significant effects were shown). First, participants aged 60 years or more used Western biomedicine less frequently (OR (odds ratio) = 0.14 [95% CI (confidence interval) = 0.03, 0.76]) than other participants. Secondly, with regard to socioeconomic status, only the type of house (living in Western-style permanent house) had a positive effect on biomedicine use. Socioeconomic status did not have an effect on folk medicine. Third, the effect of the nurse's presence was negative for folk medicine use (OR = 0.39 [0.21, 0.72]). Fourth, Western biomedicine was used more frequently on the third day of illness than other days. Fifth, Western biomedicine was used more frequently (OR = 7.72 [2.65, 22.44]) and folk medicine less frequently (OR = 0.16 [0.06, 0.48]) for the treatment of severe illness.

Sixth, regarding illnesses, patients with fever or headache were treated more frequently with Western biomedicine (OR = 3.82 [1.81, 8.07] or 6.75 [2.75, 16.55], respectively) and less frequently with folk medicine. Cuts/wounds or skin disorders were less likely to be treated with Western biomedicine (OR = 0.23 [0.07, 0.78] and 0.13 [0.05, 0.52], respectively) but were not related with the use of folk medicine. *Putuputu*, the illness with a folk etiology, was a positive factor for folk medicine treatment (OR = 34.7 [3.13, 384.41]).

DISCUSSION

The Role of folk medicine

In the community examined in the present study, folk medicine was used in approximately 40% of all ill person-days. There have been few quantitative studies on the practice of traditional folk medicine in Melanesia and other indigenous societies. A previous study based on fortnightly interviews in Huli, a region of the Papua New Guinea Highlands where Christianity and European culture had arrived in the 1950s, showed that folk medicine was used rarely, accounting for only 4% of all ill person-days in the 1970s [4]. Even taking into account the fact that the interview period was different from this study, it is judged that folk medicine has played a greater role in Roviana society than in Papua New Guinea Highlands.

The results of logistic regression analysis revealed the factors involved in the use of folk medicine. Firstly, the fact that none of the socioeconomic variables was related to the use of folk medicine was important because it indicates the familiarity of folk medicine as an indigenous traditional practice among villagers. It should be noted, however, that the preferred use among elders might reflect a strong cultural affinity continuing mainly in this age group while younger generations are more likely to use Western biomedicine than folk medicine.

The analyses also revealed that folk medicine was preferred during the absence of the nurse and in the treatment of less severe cases. These results suggest that folk medicine serves as an alternative to Western biomedicine and that it is less important than Western biomedicine. This assumption is supported by the other result that both the nurse and the villagers themselves turned to Western biomedicine instead of folk medicine in cases of severe illness.

One of the most important findings, on the other hand, was that folk medicine was used for the treatment of *putuputu*, an illness with an indigenous name and etiology. Several informants believed that Western biomedicine had no effective way to deal with this illness whereas their own medical system did. This belief is thought to have deter-

Table 3. Factors for choosing Western biomedicine or folk medicine, determined by logistic regression analysis (odds ratio and 95% confidence limit in parentheses)^a

	Western biomedicine (450 person-days)	Folk medicine (450 person-days)
Individual characteristics		
Age group (years)		
60- (yes = 1; no = 0)	0.14 (0.03, 0.76)	6.27 (1.30, 30.13)
Household socioeconomic status		
House (permanent = 1; leaf = 0)	3.70 (1.11, 12.33)	
Aidpost (open = 1; closed = 0)		0.39 (0.21, 0.72)
Severity		
Number of day		
3rd day (yes = 1; no = 0)	2.91 (1.02, 8.31)	
Class (severe = 1; else = 0)	7.72 (2.65, 22.44)	0.16 (0.06, 0.48)
Illness		
Simple illness		
Fever (yes = 1; no = 0)	3.82 (1.81, 8.07)	0.23 (0.08, 0.61)
Headache (yes = 1; no = 0)	6.75 (2.75, 16.55)	0.26 (0.08, 0.84)
Cut/wound (yes = 1; no = 0)	0.23 (0.07, 0.78)	
Puna (yes = 1; no = 0)		0.16 (0.03, 0.92)
Skin (yes = 1; no = 0)	0.13 (0.03, 0.52)	
Complex illness		
<i>Putuputu</i> (yes = 1; no = 0)		34.70 (3.13, 384.41)
Wald statistics	116.55	102.29
<i>P</i>	<0.0001	<0.0001

^aVariables with significant effects were shown; other variables included in the models were:

(a) Individual characteristics:

Sex (male = 1), 5-18-year-old, 18-30-year-old, and 30-60-year-old age groups,

(b) Household socioeconomic status:

Birthplace of household head (Saikile = 1; others = 0), age of household head, household head's education higher than primary school (yes = 1; no = 0), household head's experience of living in town (yes = 1; no = 0), household head's experience of waged job (yes = 1; no = 0)

(c) Characteristics of illness:

All illnesses shown in Tables 1 and 2 (yes = 1; no = 0).

mined their treatment-seeking behavior and suggests that the villagers continue to need folk medicine in addition to newly introduced biomedicine. Overall, most of the folk medical practices will likely be displaced by effective Western-biomedical alternatives, but others, although limited in number, persist as culturally indispensable treatments for indigenous illnesses.

The Role of Western biomedicine

In general, Western biomedicine was used preferably for the treatment of headache, fever, and introduced illnesses (i.e., malaria and pneumonia), although the effect of the introduced illnesses disappeared when other factors were adjusted. According to the respondents, medical personnel and schoolteachers discouraged the use of folk medicine for treatment of malaria and pneumonia because these illnesses can be fatal and instead recommended the use of Western biomedicine as a powerful measure. In fact, the villagers believed that almost all deaths in the village were caused by these illnesses even though few of them had had

a biomedical check. Related illnesses such as fever and headache were therefore treated preferably with biomedicine. "Abdominal malaria (*malaria tia*)" was treated exclusively with biomedicine because of the villagers' recognition that it is caused by a kind of "germ" which they described as being transmitted by flies. This indicated some confusion regarding the cause of the illness. The Malaria Control Programme has been the most intensively promoted health program in Solomon Islands, but it seems to have caused confusion regarding the cause of malaria. Indeed, misunderstandings as to malarial etiologies have also been reported in medical-sociological research in Malaita Province [29].

In the logistic models, housing type and severity of illness were also factors for the use of biomedicine. It is reasonable that Western biomedicine was preferably used in the households with a permanent Western-style house since both correlate with modernity. The fact that biomedicine was used more frequently in severer cases and in the later days of illness suggested that the villagers in the study com-

munity recognize that biomedicine wields stronger curing power than folk medicine.

Coexistence of folk medicine and Western biomedicine

Ethnographic studies have pointed out the existence of medical pluralism, which is defined as the coexistence of different medical systems, in Melanesian societies [4, 9, 30, 31]. The authors argue that traditional folk medicine and Western biomedicine are complementary rather than competitive. The patterns of the community in the present study where Western biomedicine is used for the treatment of illnesses originating from other areas and folk medicine for *putuputu*, were similar to that of previous reports [4, 9, 12, 13]. It is thus judged that Roviana society, like other societies [4, 30], is receptive to innovations that are readily available and effective, while maintaining useful indigenous technologies.

This study, on the other hand, reveals the complicated nature of treatment choice as follows. First, the fact that *tuku ibibu*, an illness with an indigenous name and etiology, was treated exclusively with Western biomedicine rather than folk medicine (Table 2) indicated that medical systems and illnesses should be recognized, not as dichotomous, but as dynamic or plural. Second, the fact that the villagers' behavior was strongly affected by the availability of a nurse indicated that the role of both Western biomedical and folk medical systems is dependent on availability of a biomedical professional even within a single society. In conclusion, this quantitative analysis supported the existence of medical pluralism in a rural society of the Solomon Islands, but suggested that this plurality is dynamic and subject to change depending on the availability of a biomedical infrastructure.

Implications for International Health

The results of this study, which showed how villagers accepted introduced biomedicine and often misunderstood it while continuing to use their own folk medicine, are useful from the viewpoint of international health. For instance, the improvement of the biomedical infrastructure by the continuous presence of a nurse, the appropriate supply of drugs, and the provision of regular medical check-ups for malaria is an essential prerequisite for health promotion. In the process, however, the appropriate dosage and use of drugs should be monitored because villagers often misunderstand Western biomedical notions and because the improper use of drug is potentially fatal [18, 31].

At the same time, from the viewpoint of encouraging primary health care and conserving indigenous knowledge, the effectiveness of folk medicine should also be positively re-evaluated [2, 32]. Although traditional folk medicine has undergone changes due to governmental health education

and policies, the Olive villagers still conserve knowledge of their own medicine and practice it at a high frequency. Since the biological effectiveness of some herbal plants found in the Solomon Islands has already been recognized [33, 34], the appropriate use of folk medicine can help to reduce the cost of medical care. Moreover, when traditional knowledge is disappearing quickly in the world, societies still using folk medicine should be encouraged from the viewpoint of the conservation of indigenous environmental knowledge [35].

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REFERENCES

- 1 . Foster, G.M. and Anderson B.G., 1978. Medical Anthropology. John Wiley and Sons, New York.
- 2 . World Health Organization, 1978. The Promotion and Development of Traditional Medicine, World Health Organization Technical Report Series 622. World Health Organization, Geneva.
- 3 . Macdonald, J., 1985. Contemporary Healing Practices in Tikopia, Solomon Islands. In: C. D. F. Parsons (Ed.), Healing Practices in the South Pacific, University of Hawaii Press, Honolulu, pp. 65-86.
- 4 . Frankel, S., 1986. The Huli Response to Illness. Cambridge University Press, Cambridge.
- 5 . Baker, M., 1987. Perspectives on Health Care in Malaita. In: J.S. Friedlaender, with W. Howell, and J.G. Rhoads (Eds.), The Solomon Islands Project: A Long-term Study of Health, Human Biology, and Culture Change, Oxford University Press, New York, pp. 61-64.
- 6 . Chowning, A., 1989. The Doctor and the Curer: Medical Theory and Practice in Kove. In: S. Frankel and G. Lewis (Eds.), A Continuing Trial of Treatment: Medical Pluralism in Papua New Guinea, Kluwer Academic Publishers, Dordrecht, pp. 217-247.
- 7 . Frankel, S. and Lewis G., 1989. Patterns of Continuity and Change. In: S. Frankel and G. Lewis (Eds.), A Continuing Trial of Treatment: Medical Pluralism in Papua New Guinea, Kluwer Academic Publishers, Dordrecht, pp. 1-33.
- 8 . Finau, S.A., 1994. Traditional Medicine in the Modern Pacific: A Dilemma or a Blessing? In: J. Morrison, P. Ger-

- aghty, and L. Crowl (Eds.), *Fauna, Flora, Food and Medicine: Science of Pacific Island People*, Volume 3., University of the South Pacific, Suva, pp. 47-64.
- 9 . Shirakawa, C., 1999. Dengue Fever Outbreak and the Place of Traditional Medicine among the People of Tongoa, Vanuatu. *Man and Culture in Oceania* 15, 45-64.
 - 10 . Janzen, J.M., 1978. *The Quest for Therapy in Lower Zaire*. University of California Press, Berkeley.
 - 11 . Press, I., 1980. Problems in the Definition and Classification of Medical Systems. *Social Science & Medicine* 14B, 45-57.
 - 12 . Schwartz, L.R., 1969. The Hierarchy of Resort in Curative Practices: The Admiralty Islands, Melanesia. *Journal of Health and Social Behavior* 10, 201-209.
 - 13 . Welsch, R.L., 1983. Traditional Medicine and Western Medical Options among the Ningerum of Papua New Guinea. In: L. Romanucci-Ross, D.E. Moerman, and L.R. Tancredi (Eds.), *The Anthropology of Medicine: From Culture to Method*, Praeger Publishers, New York, pp. 32-53.
 - 14 . Cosminsky, S., 1977. The impact of methods on the analysis of illness concepts in Guatemalan community. *Social Science and Medicine* 11, 325-332.
 - 15 . Wood, C.H., Vaughan, J.P., and de Glanville, H., 1981. *Community Health*. African Medical and Research Foundation, Nairobi.
 - 16 . Waxler-Morrison, N.E., 1988. Plural medicine in Sri Lanka; Do Ayurvedic and Western medical practices differ? *Social Science and Medicine* 27(5), 531-544.
 - 17 . Easthope, G., Tranter, B., and Gill, G., 2000. General Practitioners' attitude toward complementary therapies. *Social Science and Medicine* 51, 1555-1561.
 - 18 . Okumura, J., Wakai, S., and Umenai, T., 2002. Drug utilization and self-medication in rural communities in Vietnam. *Social Science and Medicine* 54, 1875-1886.
 - 19 . Muller, O., Traore, C., Becher, H., and Kouyate, B., 2003. Malaria morbidity, treatment-seeking behavior, and mortality in a cohort of young children in rural Burkina Faso. *Tropical Medicine and International Health* 8(4), 290-296.
 - 20 . Sudha, G., Nirupa, C., Rajasakthivel, M., Sivasubramanian, S., Sundaram, V., Bhatt, S., Subramaniam, K., Thiruvalluvan, E., Mathew, R., Renu, G., and Santha, T., 2003. Factors influencing the care-seeking behavior of chest symptoms: A community-based study involving rural and urban population in Tamil Nadu, South India. *Tropical Medicine and International Health* 8(4), 336-341.
 - 21 . Mitchell, D., Nash, J., Ogan, E., Ross, H., Bayliss-Smith, T., Keesing, R.M., Akin, K.G., and Friedlaender J.S., 1987. Ethnographic Description and Recent Histories of the Survey Groups. In: J.S. Friedlaender, with W. Howells, and J. G. Rhoads (Eds.), *The Solomon Islands Project: A Long-term Study of Health, Human Biology, and Culture Change*, Oxford University Press, New York, pp. 14-27.
 - 22 . Aswani, S., 2000. Changing Identities: The Ethnohistory of Roviana Predatory Head-hunting. *Journal of the Polynesian Society* 109(1), 39-70.
 - 23 . Hviding, E. and Bayliss-Smith T., 2000. Islands of Rainforest: Agroforestry, logging and eco-tourism in Solomon Islands. Ashgate Publishing, Aldershot.
 - 24 . Bennett, J. A., 2000. *Pacific Forest: A History of Resource Control and Contest in Solomon Islands, c. 1800-1997*, White Horse Press, Cambridge.
 - 25 . Statistic Office, 1997. *Village Resources Survey 1995/96*. Statistical Bulletin No. 10/97: Report 2. Statistic Office, Ministry of Finance, Solomon Islands, Honiara.
 - 26 . Aswani, S., 1999. Common property models of sea tenure: A case study from the Roviana and Vonavona Lagoons, New Georgia, Solomon Islands. *Human Ecology* 27, 417-453.
 - 27 . Sheppard, P.J., Walter, R., and Nagaoka, T., 2000. The archeology of head-hunting in Roviana Lagoon, New Georgia. *Journal of Polynesian Society* 109(1), 9-37.
 - 28 . Furusawa, T., and Ohtsuka, R., 2006. Inter-household variations in subsistence strategies within a rural society of Roviana, Solomon Islands: An analysis of agricultural production and cash income in relation to socio-demographic factors. *Tropics*, in press.
 - 29 . Dulhunty, J.M., Yohannes, K., Kourleoutov, C., Manuopangai, V.T., Polyn, M.K., Parks, W.J., and Bryan J.H., 2000. Malaria Control in Central Malaita, Solomon Islands 2: Local Perceptions of the Disease and Practices for Its Treatment and Prevention. *Acta Tropica* 75, 185-196.
 - 30 . Lambert, H., 1996. Popular therapeutics and medical preference in rural north India. *Lancet* 348, 1706-1709.
 - 31 . Warner, D., and Sanders, D., 1997. *Questioning the Solution: The Politics of Primary Health Care and Clinical Survival*. Health Wrights, Palo Alto.
 - 32 . World Health Organization, 1966. *Traditional Medicine, Fact Sheets N134*. World Health Organization, Geneva.
 - 33 . Henderson, C.P., and Hancock, I.R., 1988. *A Guide to the Useful Plants of Solomon Islands*. Ministry of Agriculture and Land, Solomon Islands, Honiara.
 - 34 . World Health Organization Regional Office for the Western Pacific, 1998. *Medicinal Plants in the South Pacific*, WHO Regional Publications Western Pacific Series No. 19. World Health Organization Regional Office for Western Pacific, Manila.
 - 35 . Kalland, A., 2000. Indigenous knowledge: Prospects and limitations. In R. Ellen, P. Parks, and A. Bicker (Eds.), *Indigenous Environmental Knowledge and its Transformations: Critical Anthropological Perspectives*, Harwood Academic Publishers, Amsterdam, pp. 319-336.