

Factors determining job satisfaction of malaria community microscopists in Palawan, the Philippines: a cross-sectional mixed-methods study

Emilie Louise Akiko Matsumoto-Takahashi^a, Pilarita Tongol-Rivera^b, Elena Andino Villacorte^b, Ray Uyaan Angluben^c, Masamine Jimba^{d,*} and Shigeyuki Kano^{a,*}

^aDepartment of Tropical Medicine and Malaria, Research Institute, National Center for Global Health and Medicine, 1-21-1 Toyama, Shinjuku-ku, Tokyo 162-8655, Japan; ^bDepartment of Parasitology, College of Public Health, University of the Philippines Manila, 625 Pedro Gil Street, Ermita Manila, Philippines; ^cPilipinas Shell Foundation, Inc., Puerto Princesa City, Palawan 5300, Philippines; ^dDepartment of Community and Global Health, Graduate School of Medicine, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8654, Japan

*Corresponding author: Tel: +81-3-3202-7181; E-mail: kano@ri.ncgm.go.jp

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Background This study was conducted to investigate the overall job satisfaction and its associated factors among microscopists as community health workers who specialize in malaria microscopic diagnosis and treatment in Palawan, the Philippines. The study offered new insights to further lessen the burden of malaria and improve treatment by enhancing their commitment and satisfaction.

Methods A quantitative study was conducted with 217 microscopists who were asked about their sociodemographic characteristics, ability as microscopists (service quality, knowledge of malaria and ability to diagnose malaria by microscopy [malaria microscopy]) and job satisfaction. Structural equation modelling (SEM) was conducted to analyse these factors. A qualitative study was also conducted and four focus group discussions (FGDs) were carried out.

Results SEM identified that the job satisfaction of microscopists was enhanced by ability in malaria microscopy, the annual parasite index and belonging to ethnic minorities. In the FGDs, high job satisfaction was seen in their devotion to the community and increasing knowledge about malaria.

Conclusions Providing opportunities to improve malaria microscopy ability would increase the overall job satisfaction of microscopists and eventually improve the quality of care.

Keywords: community health workers, health equity, job satisfaction, malaria, patient, Philippines

Introduction

Determining the job satisfaction of community health workers (CHWs) can offer new insights to further lessen the burden of disease and improve treatment by enhancing the commitment and satisfaction of CHWs with their job. As in other occupations, job satisfaction can be an important determinant of the motivation and performance of CHWs; however, there have been few studies on this topic.^{1,2} CHWs are community members with a limited amount of training and supplies who provide basic health and medical care. They have been used to fill the shortage of highly educated health professionals. Since CHWs are often unpaid, job

satisfaction among CHWs is very important for their continued involvement. The elucidation of factors that contribute to their job satisfaction would be useful for developing community-based strategies to improve their job satisfaction. The strategies may thus improve their retention and the quality of care they provide. CHW job satisfaction has been shown to be related to the following factors through both quantitative and qualitative studies: personal desire to help the community, gaining new skills and knowledge, client improvement from treatment and respect from their communities.^{3–5}

A community-based malaria control strategy was established in 1999 in Palawan, one of the most malaria-endemic provinces

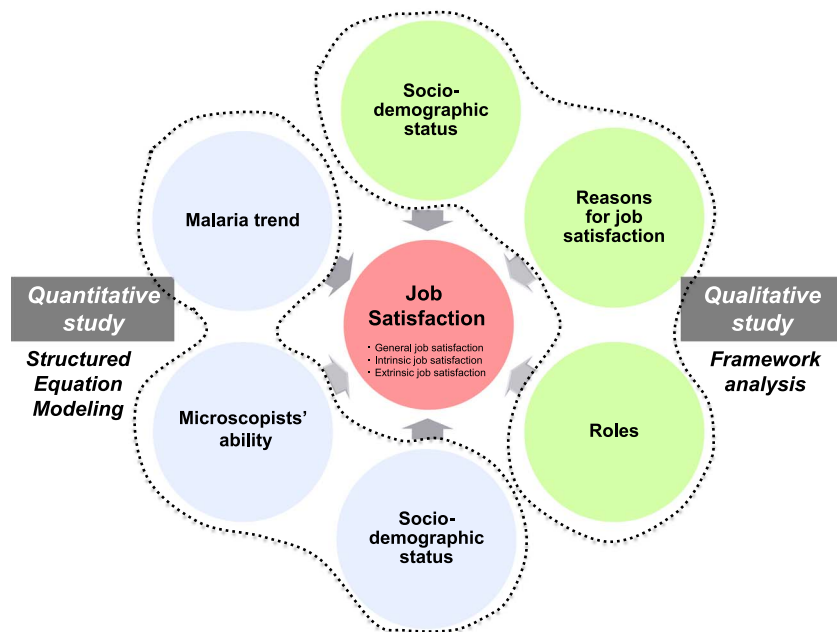


Figure 1. Conceptual framework. The present study was a mixed-methods study. The quantitative study was analysed using SEM and the qualitative study was analysed using framework analysis. In the initial SEM analysis, the dependent variable was general job satisfaction and the independent variables were sociodemographic status, microscopists, ability (service quality, knowledge of malaria and malaria microscopy ability) and malaria trend (API). All variables used in the SEM were analysed as continuous observed variables.

of the Philippines.⁶ Microscopists, key CHWs in Palawan, diagnose malaria in febrile patients via blood smear microscopy, prescribe first-line antimalarial drugs to malaria-infected patients and implement community awareness-raising activities. Thus far, this malaria control strategy has been evaluated based on epidemiological data (morbidity and mortality),⁷ the behaviour and perceptions of the microscopists⁸ and the behaviour and perceptions of recipients as determinants of effective prevention and appropriate treatment.^{9,10} For example, following the launch of the strategy, the capability to provide an early diagnosis and prompt treatment was extended throughout the province, resulting in a drastic decrease in malaria-associated morbidity and mortality in Palawan.⁴ The annual parasite index (API) per 1000 population in Palawan decreased from 27.6 in 2004 to 13.0 in 2010 and was still 0.47 in 2017.¹¹

The present mixed-methods study was conducted to investigate the overall job satisfaction of microscopists as well as the factors associated with their job satisfaction, with the aim of accelerating efforts to eliminate malaria in Palawan. Microscopists were performing more advanced medical care (microscopic malaria diagnosis) than the subjects of the existing literature and there was little evidence of factors that affect their job satisfaction. A quantitative study was conducted to investigate the sociodemographic characteristics and ability (service quality, knowledge of malaria and ability to diagnose malaria by microscopy [malaria microscopy ability]) of the microscopists and the API for their location. A qualitative study was also conducted to provide more in-depth data on factors determining their job satisfaction. The findings should be useful for strengthening community-based malaria control.

Materials and methods

Study design

The present convergent parallel mixed-methods study was a cross-sectional study that was conducted in highly malaria-endemic rural villages in Palawan, the Philippines (Figure 1). Both quantitative and qualitative data were collected and analysed separately and then the results were compared to investigate whether the findings confirmed and reinforced each other.¹² After ethical approval, permission to perform the present study was obtained from the governor of the Palawan Provincial Health Office. Lists of malaria patients in 2010 were then collected from rural health units. These lists were used to select highly malaria-endemic villages in Palawan. Study sites were chosen based on malaria transmission (at least two cases a year per 1000 population) and following discussions with local malaria experts. Data collection occurred at a malaria congress in the southern municipality (Brooke's Point) in November 2010 and at refresher courses held in the northern municipalities (Tay Tay and San Vicente) in February 2011.

Quantitative study

Interviews using questionnaires were carried out with microscopists in Palawan (Figure 2). All questionnaires were developed in English and then translated into Tagalog by local malaria experts who were fully knowledgeable of the situation of the microscopists in Palawan. All the microscopists spoke Tagalog. The microscopists were asked about their sociodemographic characteristics, their ability (service quality, knowledge on malaria and

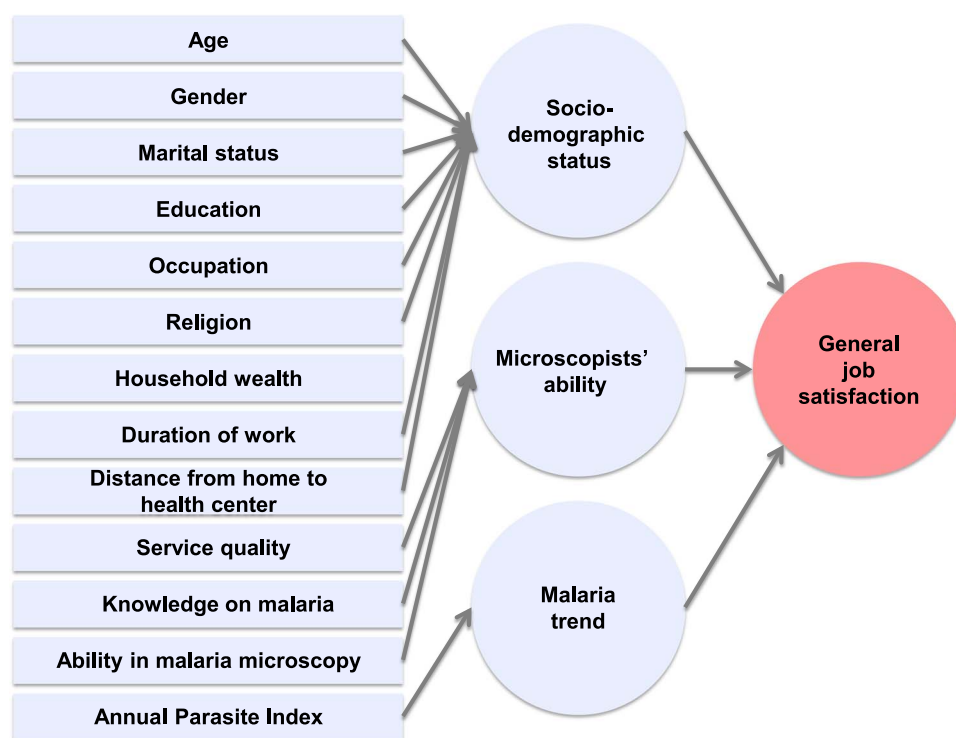


Figure 2. Statistical analysis of quantitative study. The dependent variable was general job satisfaction and the independent variables were socio-demographic status (age, gender, marital status, education, occupation, religion, household wealth, duration of work, and distance from home to health center), microscopists' ability (service quality, knowledge on malaria, and malaria microscopy ability), and malaria trend (annual parasite index). All variables used in the SEM were analyzed as continuously observed variables.

malaria microscopy ability) and their job satisfaction and these were then calculated as in previous studies.⁸⁻¹⁰ The short form of the Minnesota Satisfaction Questionnaire was used to measure job satisfaction. It included 20 questions with five response levels ranging from 'very dissatisfied (1)' to 'very satisfied (5)'. Data on malaria trends, such as the API of each site of assignment, were also collected from the Palawan Provincial Health Office.

Two types of statistical analysis were conducted after confirming the accuracy of the entered data. First, to provide an overview of the characteristics of the microscopists, a descriptive analysis was conducted. Second, to identify the factors associated with appropriate treatment, structural equation modelling (SEM) analysis was performed. SEM has been described as a combination of exploratory factor analysis and multiple regression.¹³ It is now widely used in the behavioural sciences and is suitable for exploratory analysis using multiple factors. Based on our previous studies,⁷⁻¹⁰ the initial analysis was set as follows: the dependent variable was general job satisfaction and the independent variables were sociodemographic status, microscopists' ability (service quality, knowledge on malaria and malaria microscopy ability) and malaria trend (API) (Figure 2). All variables were used as continuous observed variables. The correlation of all variables was examined and a path model was built based on the results of a bivariate analysis (cut-off value $p < 0.10$). The fit of the model was examined in terms of degrees of freedom (df), χ^2 (CMIN), comparative fit index (CFI) and root mean square error of approximation (RMSEA).

According to the conventional criteria, a good fit was indicated by CMIN/df < 2, CFI > 0.97 and RMSEA < 0.05, and an acceptable fit was indicated by CMIN/df < 3, CFI > 0.95 and RMSEA < 0.08.¹⁴ All statistical analyses were conducted using SPSS version 18.0 and Amos 18.0 (SPSS, Chicago, IL, USA).

Qualitative study

Four focus group discussions (FGDs) were successfully conducted in four municipalities: two (Tay Tay and San Vicente) from the northern region and two (Bataraza and Brooke's Point) from the southern region. The incidence of malaria and the socio-economic status of each region were taken into consideration when choosing the municipalities to use as representative study sites. The FGDs were conducted in the local language (Tagalog) by female facilitators who were local malaria experts with extensive experience in holding FGDs. During the discussions, open-ended questions were used to ask the microscopists about their roles and the reasons for their job satisfaction. Data were transcribed and analysed by a framework analysis using NVivo 10 software (QSR International, Doncaster, VC, Australia).¹⁵

Ethical statement

The present study was approved by the Research Ethics Committee of the University of Tokyo (no. 3001) and was upheld by the Palawan Provincial Health Office (PHO). All microscopists

Table 1. Sociodemographic characteristics of the microscopists

Sociodemographic characteristics	Quantitative study (n=127)	Qualitative study (n=50)
Age (years), mean (SD)		
Gender, n (%)	39.4 (7.4)	38.6 (6.8)
Male	13 (10.2)	8 (16.0)
Female	114 (89.8)	41 (82.0)
Marital status, n (%)		
Never married	12 (9.4)	5 (10.0)
Married	105 (82.7)	42 (84.0)
Divorced	2 (1.6)	1 (2.0)
Widowed	6 (4.7)	2 (4.0)
Education, n (%)		
No grade completed	3 (2.4)	3 (6.0)
Elementary	1 (0.8)	1 (2.0)
High school	61 (48.0)	28 (56.0)
Higher	58 (45.7)	18 (36.0)
Occupation, n (%)		
Homemaker	93 (73.2)	33 (66.0)
Farmer	14 (11.0)	12 (24.0)
Other	20 (15.7)	5 (10.0)
Religion, n (%)		
Catholic	86 (67.7)	28 (56.0)
Christian except Catholic	35 (27.6)	22 (44.0)
Household wealth ^a , mean (SD)	3.0 (1.6)	2.5 (1.4)
Duration of work as microscopist (months), mean (SD)	94 (38.7)	94 (45.9)
Distance from home to health centre (min), mean (SD)	21 (26.3)	22 (30.0)

SD: standard deviation.

^aThis scale ranges from 1 to 8 points with 1 point each for the following: electricity, radio, television, refrigerator, bicycle, motorcycle, bike/car and tin or cement wall.

Table 2. Activities as microscopists (N=127)

Activities	Mean	SD	95% CI	
			Minimum	Maximum
Preventive activities (hours/week)				
Dry season	18.2	24.9	0	90
Wet season	16.3	21.6	0	77
Curative activities (hours/week)				
Dry season	9.4	18.0	0	54
Wet season	8.4	16.4	0	43
Patients per week	6.6	5.9	0	20

clearly understood the principles of confidentiality and voluntary participation. No individuals associated with these malaria control programmes were present when the microscopists were answering the questions.

Results

The average age of the microscopists was the late 30s and most microscopists were married women and homemakers (Table 1).

More than 90% of the patients had graduated from high school. All of the microscopists were Christian. Most microscopists had at least 8 y of experience as microscopists and were living within a 20 min walk from the health centre where they worked as microscopists. The microscopists tended to spend more time in preventive activities and curative activities in the dry season than in the wet season (Table 2). This might have been due to the road conditions in the wet season. The microscopists saw 6.6 patients per week and 16% of the microscopists diagnosed at

Table 3. Detailed diagnoses per week (N=127)

Species	n	%
Total		
No patients	106	84.1
1 patient	10	7.9
2 patients	7	5.6
3 patients	2	1.6
4 patients	1	0.8
<i>Plasmodium falciparum</i>		
No patients	110	87.3
1 patient	8	6.3
2 patients	5	4.0
3 patients	2	1.6
4 patients	1	0.8
<i>Plasmodium vivax</i>		
No patients	122	96.8
1 patient	2	1.6
2 patients	2	1.6
3 patients	0	0
4 patients	0	0

least 1 malaria patient per week (Table 2 and Table 3). *Plasmodium falciparum* malaria accounted for 80% of the diagnoses; the remaining cases were *Plasmodium vivax* malaria.

Quantitative study

The general job satisfaction of the microscopists was high (Table 4). The average score was 83.4 points and the maximum score was 100. Intrinsic job satisfaction was rated somewhat higher (50.8/60) than extrinsic job satisfaction (24.8/30). For example, the microscopists had high intrinsic job satisfaction because they had ‘the chance to do things for other people (Q9: 4.5 points)’, ‘the chance to tell people what to do (Q10): 4.6 points’, and ‘the feeling of accomplishment they get from the job (Q20: 4.4 points)’. On the other hand, extrinsic job satisfaction, such as ‘my pay and the amount of work I do (Q13: 3.4 points)’ and ‘the freedom to use my own judgement (Q15: 3.9 points)’, was relatively low.

Bivariate analysis of all variables was performed (Table 5). Among them, general job satisfaction was significantly correlated with the API, ability in malaria microscopy and ethnicity. Based on these results, a hypothetical SEM was built to examine the factors associated with the job satisfaction of microscopists (Figure 3). The SEM adequately fitted the data according to the conventional criteria¹⁴ (CMIN/df=0.3, CFI=1.000, RMSEA=0.000). The job satisfaction of microscopists was significantly and independently enhanced by three factors: high malaria microscopy ability, a high API and being of an ethnic minority. A high API was significantly associated with being of an ethnic minority.

Qualitative study

The microscopists were satisfied because they were able to help the community (code: devotion) and increase knowledge about

malaria (code: inquisitive) (Table 6). Some were satisfied because they could learn about medical aspects other than malaria, such as immunization, measuring blood pressure and body weight, and breastfeeding assistance. This additional knowledge was taught by midwives working in the health centre where the microscopists worked.

‘I am satisfied because I have additional knowledge and was able to help people in the barangay (Tagalog: village)’ (codes: satisfied, devotion and inquisitive).

Moreover, the decrease in the incidence of malaria was an aspect only the microscopists in the northern region mentioned as a source of satisfaction (code: case reduction).

‘As of now, I am satisfied as [a] microscopist. When I was trained, malaria cases in our area were very high. I remember after my training when I got back to our house my 2 siblings and my father were sick with malaria. I diagnosed them as malaria-positive. Later, I just realized that malaria cases in our barangay (Tagalog: village) have gone down. Last year I had no positive case. I can say that malaria is really going down’ (codes: satisfied and case reduction).

Discussion

The present mixed-methods study was conducted to investigate the overall job satisfaction and its associated factors among the microscopists in Palawan, the Philippines. In the quantitative study, the job satisfaction of microscopists was independently and significantly enhanced by three factors: high malaria microscopy ability, a high API and being of an ethnic minority. A high API was significantly associated with being of an ethnic minority. In the qualitative study, microscopists were satisfied because they were able to help the community and increase their knowledge about malaria.

In the quantitative study, a high malaria microscopy ability significantly enhanced the job satisfaction of microscopists. The microscopists with high malaria microscopy ability can appropriately diagnose and treat their patients. Thus motivation is an important factor for the quality of care. In return, patients appreciate the microscopists, which enhances their job satisfaction and may therefore aid in their retention. In fact, in our previous study, a high malaria microscopy ability was important for enhancing the satisfaction of patients with their microscopists (to be published elsewhere). This result seems to be natural since the most important demand of patients is to be appropriately diagnosed.

In addition, the enhancement of malaria microscopy ability also strengthened the microscopists, community awareness-raising activities. These activities enhanced the effective prevention practices implemented by the residents of Palawan and increased the likelihood that they would seek appropriate treatment.^{7–10} Thus periodic refresher courses would be important for sustaining the satisfaction of patients with the quality of care until the day malaria is eliminated.

In the quantitative study, a high API and being of an ethnic minority significantly enhanced the job satisfaction of microscopists, especially since more microscopists who belonged to ethnic minorities lived in villages with high APIs. While the human populations of the southern and northern regions were almost

Table 4. Job satisfaction among microscopists (N=127)

Job satisfaction	Mean	SD	95% CI	
			Minimum	Maximum
Q1. Being able to keep busy all the time	4.1	0.8	3	5
Q2. The chance to work alone on the job	4.2	0.8	3	5
Q3. The chance to do different things from time to time	3.9	1.0	1	5
Q4. The chance to be 'somebody' in the community	4.3	0.9	2	5
Q5. The way my boss handles his/her workers	4.0	1.0	2	5
Q6. The competence of my supervisor in making decisions	3.8	1.0	1	5
Q7. Being able to do things that do not go against my conscience	4.3	0.9	3	5
Q8. The way my job provides for steady employment	4.4	0.8	3	5
Q9. The chance to do things for other people	4.5	0.7	3	5
Q10. The chance to tell people what to do	4.6	0.6	3	5
Q11. The chance to do something that makes use of my abilities	4.2	0.9	3	5
Q12. The way malaria control programme policies are put into practice	4.7	0.5	4	5
Q13. My pay and the amount of work I do	3.4	1.2	1	5
Q14. The chances for advancement on this job	4.6	0.7	3	5
Q15. The freedom to use my own judgement	3.9	1.0	2	5
Q16. The chance to try my own methods of doing the job	4.2	0.9	3	5
Q17. The working conditions	3.8	0.9	2	5
Q18. The way my co-workers get along with each other	4.2	0.9	2	5
Q19. The praise I get for doing a good job	4.3	0.7	3	5
Q20. The feeling of accomplishment I get from the job	4.4	0.7	3	5
General job satisfaction ^a (maximum score: 100)	83.4	8.9	67	97
Intrinsic job satisfaction ^b (maximum score: 60)	50.8	6.2	39	60
Extrinsic job satisfaction ^c (maximum score: 30)	24.8	2.8	20	30

Each question was evaluated with five response levels ranging from 'very dissatisfied' (1) to 'very satisfied' (5).

^aThe sum of the scores for Q1–Q20.

^bThe sum of the scores for Q1–Q4, Q7–Q11, Q15, Q16 and Q20.

^cThe sum of the scores for Q5, Q6, Q12–Q14 and Q19.

Table 5. Correlation matrix (N=127)

	1	2	3	4	5	6
1 General job satisfaction	1					
2 Intrinsic job satisfaction	0.945**	1				
3 Extrinsic job satisfaction	0.807**	0.610**	1			
4 API	0.320**	0.281**	0.309**	1		
5 Ability in malaria microscopy	0.266**	0.251**	0.174	0.062	1	
6 Ethnicity ^a	0.226*	0.300**	0.106	0.359**	0.078	1
Mean	84.01	51.13	24.89	7.09	72.5	1.66
SD	8.77	6.04	2.77	8.16	6.28	0.475
Skewness	−0.312	−0.452	−0.101	1.16	−0.497	−0.690

* $p > 0.01 - < 0.05$, ** $p > 0.001 - < 0.01$, *** $p < 0.001$.

^aEthnicity was calculated as follows: Tagalog was scored as 1 and other was scored as 2.

the same in 2009 (334 392 and 330 879, respectively), the API in the southern region was 12.9 times higher than that of the northern region (18.9 and 1.46, respectively).⁷ The microscopists in the southern region had higher levels of responsibility and

could therefore acquire more trust from the community than those in the northern region, which should have enhanced the job satisfaction of microscopists in the southern region. However, and interestingly, in the qualitative study, job satisfaction was

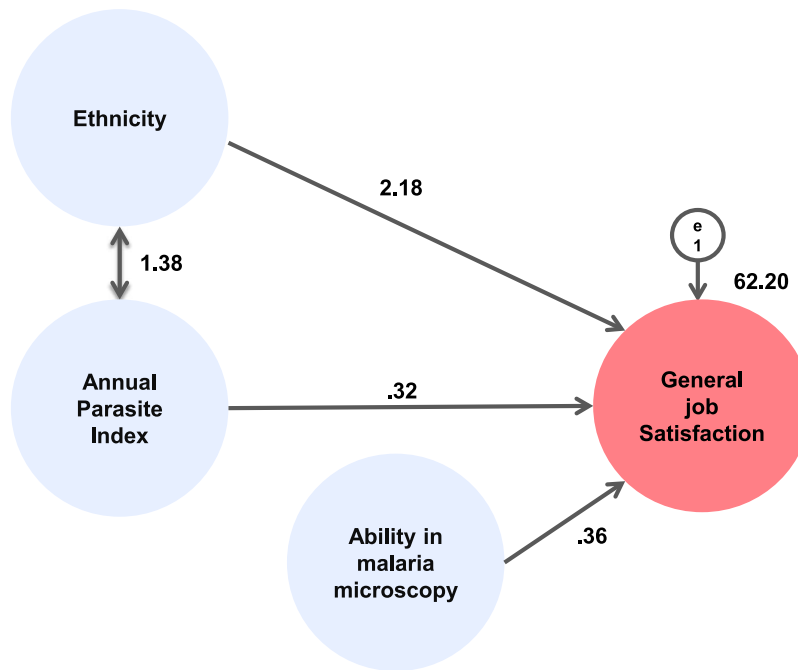


Figure 3. Determinants of general job satisfaction of microscopists (N=127): $\chi^2=0.6$, $df=2$, CFI=1.000, RMSEA=0.000. All relationships and correlations are significant ($p<0.05$). Ethnicity was calculated as follows: Tagalog and amalgamation of Tagalog was scored as 1 and other was scored as 2.

Table 6. Analytical framework of job satisfaction (N=50)

Code	Description
Devotion	To help the community, village and people
Inquisitive	To increase knowledge about malaria
Case reduction	Malaria incidence is decreasing ^a

^aOnly mentioned in the FGDs in the northern regions.

associated with case reduction only in the northern region. The decrease in malaria patients may have made the microscopists in the northern region feel a sense of accomplishment and also improved their job satisfaction.

The microscopists who belonged to ethnic minorities exhibited higher job satisfaction in the quantitative study, and this may be because they could effectively alleviate their community's suffering from malaria. In our previous study (to be published elsewhere), microscopists had an important role in delivering an early diagnosis and prompt treatment to patients with malaria, especially among vulnerable populations (lower household wealth, lower education, relatively old people and ethnic minorities). The results revealed that microscopists confronted the disparities in healthcare and that this vulnerable risk group looked to microscopists for an appropriate diagnosis and effective treatment. These ethnic minorities were vulnerable not only due to the remoteness of their villages, but also due to a lack of understanding of the national language, lower education, poor health

and nutritional status and a lack of recognition from government policies. Malaria control among these ethnic minorities is also the key to reducing the incidence of malaria in most malaria-endemic regions in Asia.^{16,17}

The qualitative study found that the high job satisfaction of microscopists was also explained by their devotion to their community and their increased knowledge about malaria. The quantitative study also supported the finding that most of the microscopists had high job satisfaction because they had the chance to do things for other people. These results were consistent with the evidence from previously reported studies that suggested CHWs were motivated by an altruistic desire to help their community and that CHWs placed a high value on gaining new skills and knowledge.^{3,18-21}

The limitations of the present study should be noted. It was not possible to conduct a random sampling because of the difficult geographical situation and security problems in Palawan. In addition, the microscopists who did not participate in the present study were mainly living on remote islands where few malaria cases were reported. Thus it could be said that the present study was able to obtain the information from areas with a greater malaria burden. Also, the generally agreed-upon sample size in the SEM is 10 participants for every free parameter estimated.¹³ In the present study, the free parameter of the final model was 2, and 127 individuals participated in the quantitative study. Another limitation of the present study was its cross-sectional design, and there may be reverse causality between some of the variables. Nevertheless, the final SEM model adequately fit the data (CMIN/df<2, CFI>0.97 and RMSEA<0.05) according to the criteria,¹⁴ and the narrative interviews extracted active statements.

Finally, the microscopists saw an average of 6.6 patients per week and only 16% of the microscopists diagnosed at least 1 malaria patient per week. Since the initiation of the microscopist training programme, early diagnosis and prompt treatment have been extended throughout Palawan, and malaria morbidity and mortality have decreased year by year. Constant effort by the microscopists is required until malaria is eliminated in Palawan.

Conclusions

The job satisfaction of the microscopists was enhanced by high malaria microscopy ability, a high API, belonging to an ethnic minority, devotion to the community and increasing knowledge about malaria. Additional strategies to improve their job satisfaction will lead to quality care and the sustainability of the community-based malaria control in Palawan.

Authors' contributions ELAM-T, MJ and SK created the present study. ELAM-T, PTR, EAV and SK conducted the field work and collected the data on the island. RUA helped in acquiring onsite information. ELAM-T analysed the data with discussions with SK. ELAM-T wrote the manuscript under the supervision of MJ and SK. All authors read and approved the final manuscript. SK is the guarantor of the paper.

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Competing interests None declared.

Conflicts of interest: None declared.

Ethical approval The study was approved by the Research Ethics Committee of the University of Tokyo (3001) and by the Palawan Provincial Health Office. All the microscopists gave written informed consent for inclusion in the study and for the use of their anonymized data. They were also told that they could withdraw from the study at any time. No individuals working in health facilities were present while the microscopists were answering the questionnaires.

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