

MIGRATION, MOBILITY AND MALARIA

A Study on Migrants' Vulnerability to Malaria
and Epidemiology of Artemisinin-Resistant
Malaria in Binh Phuoc Province, Viet Nam



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in Binh Phuoc Province, Viet Nam



IOM Development Fund
DEVELOPING CAPACITIES IN MIGRATION MANAGEMENT



**World Health
Organization**

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The data analysis and first draft were undertaken by Dr Vu Manh Loi while Tran Thi Ngoc Thu, Project Coordinator at IOM and Nina Allen finalized the report. Tamsin Fernandez-Cox (IOM) assisted with the technical and language editing of the report.

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LIST OF ACRONYMS

ACT	Artemisinin-based combination therapy
AVIL	Association of Vietnamese Investors in Laos
GPS	Global Positioning System
GSO	General Statistics Office
ILO	International Labour Organization
IMPE HCMC	National Institute of Malariology, Parasitology and Entomology in Ho Chi Minh City
IOM	International Organization for Migration
ITNs	Insecticide-treated bed nets
KAP	Knowledge, attitudes and practices
MOLISA	Ministry of Labour, Invalids and Social Affairs
NIMPE	National Institute of Malariology, Parasitology and Entomology
NMCP	National Malaria Control Programme
UN DESA	United Nations Department of Economic and Social Affairs
VND	Viet Nam Dong
WHO	World Health Organization

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EXECUTIVE SUMMARY

In Viet Nam in 2015, an estimated 11.7 million people (approximately 12.6% of the population) lived in malaria-endemic areas. Considerable progress has been made in reducing malaria in the country in recent decades, with the Government and the World Health Organization's (WHO) efforts contributing to decreasing rates of malaria and malaria-related deaths. The National Strategy for Malaria Control and Elimination 2011–2020 aims to build on this success with measures including vector control, treatment and long-lasting insecticide nets (LLINs) distribution. However, there are some worrying trends: the data shows stagnation or slower progress in reducing malaria-related admissions and deaths in 2013 and 2014, alongside the increasing emergence of resistance to artemisinin.

Recent malaria control and elimination policies and frameworks, both at the global and national level have highlighted the link between population mobility and vulnerability to malaria. Migrants and mobile people are often “hard-to-reach” or “hidden” – due to their geographical location, living conditions and/or legal status – which frequently results in their marginalization and poor access to adequate malaria prevention and health-care services. Individual migrants and their families including young children may be made more vulnerable by their socioeconomic status, low levels of immunity, health status (for example malnutrition), lack of awareness, language and education barriers, lack of documentation, discriminatory health systems and immigration policies. In addition, the movement of people from high-transmission areas can result in imported malaria cases and the potential re-introduction of malaria into low-transmission or malaria-free areas, putting both migrants and members of their origin and destination communities at risk. Internal and cross-border mobility between malaria-endemic areas also threatens to spread potentially calamitous resistance to artemisinin and other drugs used in artemisinin-based combination therapy (ACT).

Despite such growing awareness of the importance of including migrants and mobile populations in malaria strategies, there have only been a few studies that formally analyze the nexus between mobility and malaria. In Viet Nam specifically, there is not only a lack of behavioural studies on the relationship between mobility and malaria, but aggregated data related to migrant status is not collected as part of the monitoring of malaria-related programmes. The current data on malaria prevalence among migrants is small-scale or anecdotal. Further evidence is therefore required to enable a full analysis of mobility-related vulnerability to malaria and related issues, and to improve support for migrants.

In this context, the International Organization for Migration (IOM) and WHO have supported the National Institute of Malariology, Parasitology and Entomology in Ho Chi Minh City (IMPE HCMC) to undertake a study of migration and malaria. The study aimed to provide additional data and analysis on human and other factors related to: exposure to and infection with malaria, prevention of malaria, and the spread of resistance to malaria treatments. The study was guided by the following key questions:

- i) Who are the migrants and mobile populations in Binh Phuoc? What are the migration flows? How long do people stay in the province? What work do they do? Where in the province do they live? How can the different mobile populations be categorized?
- ii) In what ways are migrants and mobile populations more vulnerable to malaria than members of the local population and why?

Binh Phuoc Province has been selected as the research site for having high levels of both malaria and migration. In particular in this area, as well as in many places in the Greater Mekong Subregion, migrant vulnerabilities may be exacerbated by the specifically informal and seasonal nature of population movements. Moreover, the emergence of artemisinin resistance in Viet Nam was first recorded in Binh Phuoc in 2009 and the situation continues to worsen.

The study was conducted in two stages. First, the IMPE HCMC conducted a large-scale knowledge, attitudes and practices (KAP) household survey, led by an expert epidemiologist and with assistance from WHO,

between December 2014 and March 2015. The survey was conducted among respondents from migrant and mobile populations in six communes (three districts) in Binh Phuoc Province: Bom Bo and Dak Nhai (in Bu Dang District), Bu Gia Map and Dak O (in Bu Gia Map District), and Thien Hung and Phuoc Thien (in Bu Dop District). In order to overcome specific issues identified in the analysis of the KAP survey – including the categorization of different population groups in the province – and the extent to which migrants and mobile people are more vulnerable to malaria than local residents, a second stage of the project focusing on a much smaller in-depth study was led by an expert social demographer and with assistance from IOM in Dak O Commune, in August 2015. In order to show patterns and allow a comparative approach, the sampled populations were divided into four groups based on respondents' duration of continuous stay in a commune: the mobile migrants (six months or less); the short-term migrants (six to twelve months); the long-term migrants (one to five years) and the local residents (more than five years).

The study encountered a number of challenges. The two most significant ones are (i) the lack of reliable data on migrants and mobile populations, due to irregular and short-term movements and the fact that many of these people live/work in hard-to-reach locations; and (ii) the definition and categorization of occupations in relation to malaria risk due to the complexity of livelihood forms exercised by people at the research area. As a result, the study could not ensure a representative sub-sample of the migrant population in Binh Phuoc, neither was it able to effectively define and classify occupation-related malaria risk for the purpose of analysis.

Conclusions

The results of both surveys contribute to a better understanding of the different migration flows and mobility patterns, and their links to malaria prevention, in Binh Phuoc Province. The data shows that there are a number of specific factors that make different groups of migrants and mobile people more vulnerable to malaria than local residents. They also indicate that more targeted and migrant-friendly malaria programming is necessary to ensure effective malaria-control activities for members of these groups.

Mobility patterns

The patterns of mobility in Binh Phuoc are complicated, with longer-distance mobility (for example, people travelling into the province from outside) being only one part of the picture. It seems that both migrants/mobile people and local residents can be very mobile over shorter distances, such as within a commune. Indeed, it was found that the majority of respondents (although fewer local residents) have a secondary residence closer to their work site where they sleep. Very often, this secondary residence is located in farmland on slopes – “ray” – or a forested area, increasing their vulnerability to malaria particularly when people do not take a mosquito net with them. In addition to such short-distance mobility, both migrant/mobile and local respondents in the in-depth survey reported travelling often to other places in the province, to other provinces and even to Cambodia to find seasonal work.

Vulnerability to malaria

The study identified a number of factors that affect vulnerability to malaria and that are reported by more migrant and mobile respondents than local residents (and often, long-term migrants). A major barrier for short-term migrants and mobile people in particular is a generalized lack of access to all public and social services – including malaria prevention and treatment – due to the fact that many of them are not registered in the commune where they live. Moreover, it was found that in regards to:

- **Access to malaria-specific information and services:**
Mobile and short-term migrants are more than three times less likely than local residents to have heard of malaria. They also tend to live further away from health facilities and are less likely to have access to insecticide-treated bed nets (ITNs).
- **Knowledge:**
Short-term migrants have a much lower level of knowledge about malaria than other respondents.

- Health-care seeking behaviour:
Short-term migrants wait longer than long-term residents before seeking treatment for malaria.
- Exposure:
Short-term migrants and mobile people are more likely than long-term migrants or local residents to live in primitive or temporary structures and to spend more time in structures located in “ray” or forested areas. Mobile, short-term and long-term migrants also tend to live closer to the forest, although long-term migrants and local residents live closer in proximity to streams.

Other factors impacting on vulnerability to malaria

The survey also highlighted factors that have an impact on vulnerability to malaria, independently of migration status. These factors include education, belonging to an ethnic minority, gender, marital status, age and income.

Qualitative evidence from the in-depth study points to additional specific risks for certain groups of people who are exposed to malaria risk during the hours when Anopheles mosquitoes are most active. This includes those who live in areas where well water is scarce and therefore bathe in streams in the evening or at night (especially women, who cannot bathe during the day) and cassava-plantation workers who start their day early in the morning or work until late in the evening. For these people, mosquito nets and other protective measures (such as mosquito coils worn in caps) are of no use.

Programming and outreach implications

The study results have several implications in terms of malaria programming and outreach, particularly in the following areas:

- Access to information about malaria

Those respondents who had access to three or more different sources of information had significantly better knowledge about malaria than those with less access to information. Village health workers appear to be one of the most effective sources of information, besides television, radio, family members and neighbours. People who reported that their village has a health worker were more than six times more likely to have heard of malaria than those who did not. However, it seems that village health workers do not reach all residents: they appear more successful with long-term migrants than with other respondents. This may be a function of their presence in a village, or of residents’ awareness of this presence. Timing for awareness-raising interventions is another factor for consideration. It was noted by some respondents that such activities are often conducted in October or April, when seasonal migrants arrive in large numbers. However, this is also the busiest time for workers, particularly seasonal workers, who are likely to be focused on working and earning income and not necessarily receptive to public health interventions.

- Mosquito net access and use

A significant proportion of the respondents – including nearly half of long-term migrants and local residents – had received free ITNs distributed by the National Malaria Control Programme (NMCP). However, the limited access to free ITNs among mobile and short-term migrants is a significant concern. This lack of access can be linked to the absence of reliable statistics on these two groups of migrants, as around half are not registered (according to the in-depth study data). This makes it difficult for local health authorities to plan for and distribute free ITNs to such migrants and more creative measures and initiatives – including improved coordination – will be necessary to overcome this challenge. The quality and effective use of nets is another concern – as a respondent from the in-depth study reported using their free ITN as a fishing net – and one that can be addressed through better consultation and communication with the local community.

It should also be noted that while many people reported having received a mosquito net distributed by

the NMCP, very few were aware that these were treated with insecticides. This suggests a need for more efforts on the part of the NMCP during ITN distribution to ensure that beneficiaries understand how ITNs are different to nets bought at the market and why it is important to use them. In addition, women seem to be particularly receptive to ITNs and hence can transmit advocacy messages onward to their families and communities. The study also suggested that when planning future malaria programming in this and similar contexts, the distribution of hammocks with nets should be considered, as these may be more appropriate to the needs of a significant part of the local community (for example when people sleep at work sites and/or in the forest, where bed nets are less practical). At the same time, further studies and programming are needed to identify and address other barriers to the use of mosquito nets (such as the reported fact that the distributed ITNs are not big enough).

- Coordination of malaria prevention and treatment services

The survey data indicated that malaria services at the village level and at border posts are generally good, with village health workers, commune health centres and agency health workers collaborating well together. However, malaria services remain too heavily focused within the health sector (where stakeholders often act in isolation) and interagency coordination and collaboration are not sufficiently developed. More efforts need to be made to link malaria control with other health-related initiatives and socioeconomic development objectives, including those aiming to empower local residents, migrants and mobile populations and involve them in public health provision. Mass organizations (such as the Women's Union and Youth Union), village leaders, schools, pharmacies as well as employers could play a more important role in disseminating information about malaria.

A lack of coordination also restricts access to services – such as ITN distribution – that are impeded by the fact that many migrants are not registered. Improving coordination between the health and non-health sectors (such as the police or Departments of Labour, Invalids and Social Affairs), as well as with other stakeholders (such as farmers/plantation owners) will be essential to improving malaria prevention and treatment services.

Finally, although a significant number of migrants and mobile people maintain ties with their province of origin; interprovincial coordination does not seem to be effective. Interprovincial coordination, including between health centres, can therefore be improved — in this case particularly with those provinces from which significant numbers of people move to Binh Phuoc — in order to ensure treatment efficacy and proactive outreach to prevent the reintroduction of malaria in non-endemic areas and the spread of artemisinin resistance.

Recommendations

Policy recommendations

- Design and conduct targeted behaviour change communication programmes for both migrant and local residents in Binh Phuoc, taking into account the specific vulnerabilities and characteristics of each groups identified by the studies (and using the KAP survey results as a baseline). Increase the role of dissemination methods that have proven effective such as village health workers, TV and radio and those that have potential (including schools, mass organizations and pharmacies).
- As part of this strategy, raise awareness of the presence and role of village health workers.
- Adapt malaria prevention services in line with the survey results: provide different sizes of ITNs (individual and family) and improve ITN quality, distribute or subsidize the cost of hammock with nets. Ensure that feedback and suggestions from beneficiaries and others in the local community are systematically collected in order to ensure that malaria services (including spraying practices) are appropriate to local needs.
- Improve routine monitoring record templates and processes to collect disaggregated data at the community health centre level, including: migrant status, registration status, permanent and current address, mobility patterns (frequency of stay in forest per year), place where

malaria was contracted, intention to move during treatment. This will help to improve treatment adherence and could contribute to targeting behaviour change communication strategies. As migrant definitions remain a challenge, a small-scale pilot could be conducted to test the migrant classification method proposed in the in-depth study.

- Formulate a long-term malaria-control strategy targeting migrants and mobile people at the national and provincial levels as well as the commune level, which takes into account and address the vulnerabilities factors specific to them. This strategy must ensure coordinated efforts between sending and destination provinces and between health and non-health sectors (including police, labour and mass organizations, schools and the private sector) and identify creative solutions to overcome existing challenges, particularly the lack of access to malaria services due to registration status. Such a strategy must be evidence-based, and should take into account the evidence provided by this study and on future studies.

Research recommendations

- Replicate and enhance the research methodology piloted under this survey, especially the migrant classification method, in other provinces.
- Conduct further research on the links between: i) malaria and migration status (mobile/migrant groups compared to local residents); and ii) malaria vulnerability and occupation. In the context of the study in Binh Phuoc, the first question (i) was not clarified due to the lack of a specific timeframe for malaria incidence in the KAP survey and the small sample of the in-depth study; while for the second (ii) classifying occupations in the context of seasonal and multiple occupations was a challenge that could not be resolved.
- Conduct operational research to investigate the specific vulnerability of those groups of people for whom traditional vector control methods are not fully effective (cassava workers and those, especially women, who have to bathe in streams) and identify ways to protect them.

I. INTRODUCTION

Malaria is a leading cause of death and a major public health threat worldwide, with approximately 3.2 billion people in 97 countries at risk of contracting malaria.¹ However, it is both preventable and curable. Dramatic improvements have been made worldwide since 2000, with malaria incidence falling by 37 per cent and death rates having fallen 60 per cent by 2015.² However, resistance to the insecticides used for prevention, the drug artemisinin which forms the basis of malaria treatment and even the partner drugs used in artemisinin-based combination therapy (ACT), has been increasing and is threatening progress made towards the containment and eradication of malaria.³

I.1. Malaria containment and elimination: the importance of focusing on migrant and mobile populations⁴

The link between population mobility and vulnerability to malaria is well established. Migrants and mobile, cross-border and internally displaced people can be vulnerable to malaria-related illness and death during the entirety of the migration process; at origin, during travel and transit, at destination, and upon their return home.

Migrants and mobile people are often “hard-to-reach” or “hidden” – due to their geographical location, their living conditions and/or their legal status – which frequently results in their marginalization and poor access to adequate malaria prevention and health-care services. Individual migrants may be made more vulnerable by their socioeconomic status; low levels of immunity; health status (for example malnutrition); lack of awareness; language and education barriers; lack of documentation; discriminatory health systems and immigration policies. The financial burden of illnesses such as malaria also negatively affects migrants, their families and wider society, contributing to the cycle of poverty, and can serve to further increase migrants’ vulnerability.

In addition, the movement of people from high-transmission areas can result in imported malaria cases and the potential re-introduction of malaria into low-transmission or malaria-free areas, putting both migrants and members of their origin and destination communities at risk. Internal and cross-border mobility between malaria-endemic areas also threatens to spread potentially calamitous resistance to artemisinin and other drugs used in ACT. Finally, when family support is lacking, migrants may have no choice but to bring along their families including young children, putting the children at great risk if travel is to malaria-endemic areas. According to the World Health Organization (WHO), young children are among those most vulnerable to malaria, with 78 per cent of all malaria deaths around the world in 2013 occurring in children under five years of age.⁵

Responses to malaria in terms of containment, elimination and treatment must therefore address the specific needs and vulnerabilities of migrants and other mobile people. This requires accurate assessments of the burden of malaria amongst migrants and mobile populations and their needs, ensuring that data on malaria and migrant health are standardized and comparable within and across borders. Preventative, diagnostic and treatment services for malaria and health education also need to be adapted to the needs of migrants and mobile populations and delivered in a culturally and linguistically appropriate way (including through community-based health approaches aiming to empower individuals). Finally, regional and national malaria strategies must include migrants, mobile, cross-border and displaced populations, regardless of their legal status. Intersectoral cooperation and collaboration on malaria and migrant health across health and non-health sectors and across borders, are essential to ensuring a coherent approach.

1 World Health Organization (WHO). *Malaria: Fact Sheet No. 94*. 2015. Available from www.who.int/mediacentre/factsheets/fs094/en/. Accessed 29 January 2016.

2 Ibid.

3 Ibid.

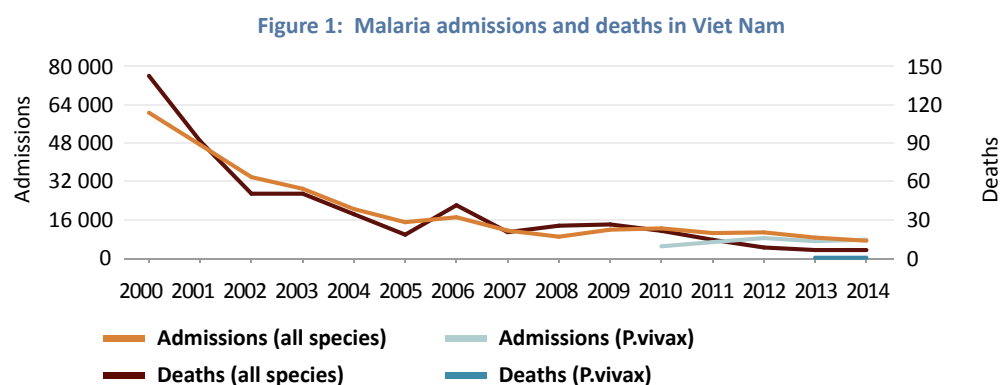
4 International Organization for Migration (IOM). *Malaria Prevention and Continuum of Care for Migrants*. 2015. Available from https://health.iom.int/sites/default/files/pdf/EN_IOM_RBMMalariaandMigrationFactSheet_final_July_2015.pdf. Accessed 29 January 2016.

5 WHO. *Malaria in children under five*. 2015. Available from www.who.int/malaria/areas/high_risk_groups/children/en/. Accessed 22 March 2016.

I.2. Malaria, migration and mobility in Viet Nam

I.2.1. Malaria

In Viet Nam in 2015, about 11.7 million people⁶ (approximately 12.6% of the population)⁷ lived in malaria-endemic areas. Considerable progress has been made in reducing malaria in Viet Nam in recent decades, with government and WHO efforts decreasing rates of malaria and malaria-related deaths (see figure 1). The National Strategy for Malaria Control and Elimination 2011–2020 aims to build on this success with measures including vector control, treatment and long-lasting insecticide nets distribution.



Source: WHO. *World Malaria Report 2015*. 2015. Available from www.who.int/malaria/publications/world-malaria-report-2015/en/. Accessed 5 May 2016.

However, there are some worrying trends: the data show stagnation or slower progress in reducing malaria-related admissions and deaths in 2013 and 2014, and the emergence of resistance to artemisinin.⁸ Artemisinin resistance was first recorded in Viet Nam in the southeastern province of Binh Phuoc, near the Cambodian border in 2009. As table 1 shows, resistance to artemisinin (as measured by delayed parasite clearance) has increased radically since then. At the time of project development, however, there was no evidence in Viet Nam of resistance to the partner drugs use for ACT.⁹

Table 1: Artemisinin efficacy in Viet Nam – Delayed parasite clearance Day 3 (%)

	2009	2010	2011	2012	2013	2014
Binh Phuoc	15.2	22.0	–	30.6	36.0	36.0
Dak Nong	0	–	–	29.2	–	26.7
Gia Lai	–	11.3	–	22.8	–	26.4
Khanh Hoa	–	–	–	–	17.4	16.7
Kon Tum	–	–	–	–	14.8	14.3
Quang Nam	0	–	–	27.3	29.2	–
Ninh Thuan	0	0	–	–	8.0	–
Quang Tri	0	0	0	0	–	–
Dak Lak	–	–	–	–	0	–
Binh Thuan	–	–	–	–	–	–

Source: Professor Bui Quang Phuc, National Institute of Malariology, Parasitology and Entomology (NIMPE). Presentation at “South-East-Asia and Western Pacific Bioregional meeting on Malaria Drug Resistance Monitoring Networks”. November 2015.

Note: Please note cells with a hyphen mean that no data was available.

⁶ 11,691,795 people. Government of Viet Nam. Ministry of Health. National Malaria Control Programme (NMCP). *Annual report 2015*. 2015.

⁷ The figure of 12.6 per cent was calculated by IOM based on 2015 United Nations (UN) population data available from <http://data.un.org/CountryProfile.aspx?crName=Viet%20Nam#Summary> (11,692/92,548).

⁸ Since the project was first formulated, evidence of improvement has been found by the NMCP (Government of Viet Nam. Ministry of Health. NMCP. *Annual report 2015*). The latest data from 2015 show a 41 per cent reduction in malaria cases (9,331 cases in 2015 compared to 15,752 cases in 2014) and in deaths (3 deaths in 2015 compared to 6 in 2014).

⁹ As of May 2016, six cases of suspected partner drug resistance had been detected in Binh Phuoc. The Government of Viet Nam and WHO are in the process of confirming these.

This issue extends beyond Viet Nam: parasite resistance to artemisinin has been detected in four other countries of the Greater Mekong Subregion: Cambodia, Lao People's Democratic Republic, Myanmar and Thailand. Studies have confirmed that artemisinin resistance has emerged independently in many areas of this subregion. While most patients are cured when treated with an ACT if there is no resistance to the partner drug, in parts of Cambodia and Thailand, *Plasmodium falciparum* resistance to both artemisinin and partner drugs (multidrug resistance) has developed. There is a real concern not only that *P. falciparum* malaria in Cambodia and Thailand is becoming increasingly difficult to treat, but that multidrug resistance could spread to other countries and regions, with dire public health consequences.¹⁰

1.2.2. Migration, mobility and malaria

Mobility is widespread in Viet Nam. Since 1976, people from the north-east and south-west have migrated in large numbers to the Central Highlands and south-east, where malaria is highly prevalent, attracted by the abundant employment opportunities in the rubber, coffee, cassava, cashew plantation and logging industries. Of particular concern are the considerable flows of migrants from and to malaria "hotspot" provinces in the Central Highlands (Kon Tum, Gia Lai, Dak Lak and Dak Nong), the South East (Binh Phuoc Province) and the North Central area (Quang Binh, Quang Tri). See map 1.

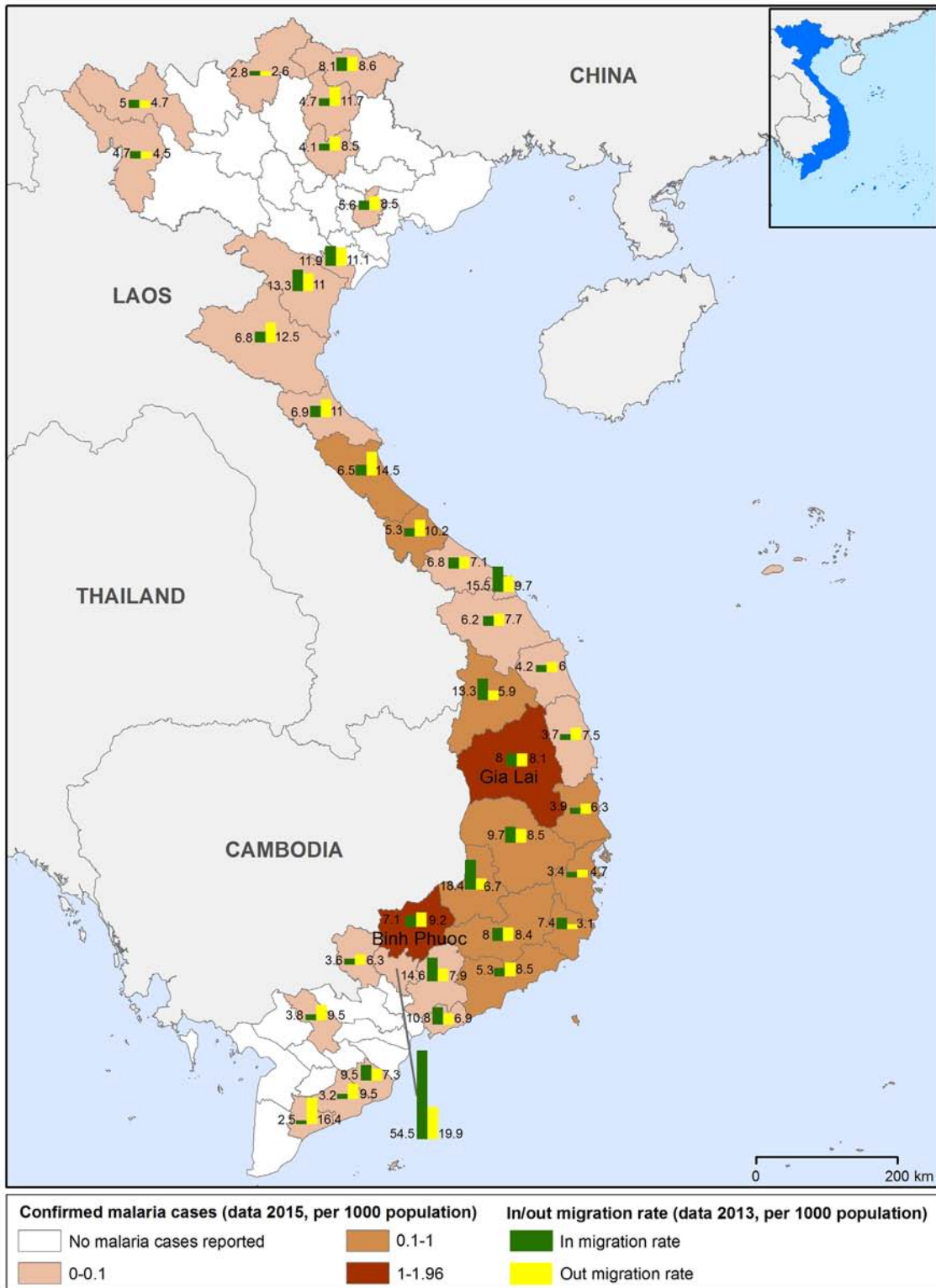
Worryingly, in the context of drug resistance, cross-border migration from Viet Nam to Lao People's Democratic Republic and Cambodia is also rapidly increasing, in part due to direct foreign investment by Vietnamese companies in such sectors as agriculture, telecommunications and banking. The Asian Development Bank quotes sources estimating that in 2010 there were as many as one million Vietnamese migrants in Cambodia and around 20,000 in Lao People's Democratic Republic.¹¹ By 2013, of the top ten destinations for Vietnamese migrant workers, Lao People's Democratic Republic and Cambodia were ranked fifth and sixth respectively, with a conservative estimate of 4,860 Vietnamese migrant workers in Lao People's Democratic Republic and 4,250 in Cambodia.¹² In 2014, the Association of Vietnamese Investors in Laos (AVIL) estimated that about 13,500 migrants from Viet Nam were working in Lao People's Democratic Republic, of whom around 8,500 were employed by three Vietnamese corporations.¹³ The AVIL also predicted that there would be as many as 20,000 Vietnamese migrants in Lao People's Democratic Republic in 2015.¹⁴ There are also significant migration flows from Viet Nam to other countries, including to Angola where malaria is highly endemic (see map 2 below).

As can be seen, there is some discrepancy between these data. Indeed, the figures may underestimate the numbers of migrant workers, as much migration from Viet Nam to Cambodia and Lao People's Democratic Republic as well as within Viet Nam is seasonal and informal. Many migrants maintain ties to their provinces of origin as a livelihoods strategy against market fluctuations and poor harvests. This results in high levels of (sometimes daily) mobility across borders and between regions in Viet Nam and between malaria endemic and non-endemic areas, making assessing the numbers of migrants very challenging.¹⁵

The maps below show the patterns of movement both within Viet Nam and across its international borders.

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- 10 WHO. *Malaria: Fact Sheet No. 94*. 2015. Available from www.who.int/mediacentre/factsheets/fs094/en/. Accessed 29 January 2016.
 - 11 Asian Development Bank (ADB). *Facilitating Safe Labor Migration in the Greater Mekong Subregion: Issues, Challenges and Forward-Looking Interventions*. 2013. Available from www.adb.org/sites/default/files/publication/30210/facilitating-safe-labor-migration-gms.pdf. Accessed 2 May 2016.
 - 12 Government of Viet Nam. Ministry of Labour, Invalids and Social Affairs (MOLISA). *Orientation for labour export activities 2014*. 2014. Available from www.molisa.gov.vn/vi/Pages/chitiettin.aspx?IDNews=20416. Accessed 27 April 2016.
 - 13 Saigon-Hanoi Securities Joint Stock Company. *Lao People's Democratic Republic: Labour Market Potential*. May 2014. Available from www.shs.com.vn/News/201495/867723/lao-thi-truong-xuat-khau-lao-dong-tiem-nang.aspx. Accessed 27 April 2016.
 - 14 *Ibid.*
 - 15 Informal migration of this kind has primarily been reported from Viet Nam, and not from Cambodia or Lao People's Democratic Republic into Viet Nam.

Map 1: Malaria prevalence and migration/mobility within Viet Nam



Map produced by IOM with financial support from the IOM Development Fund

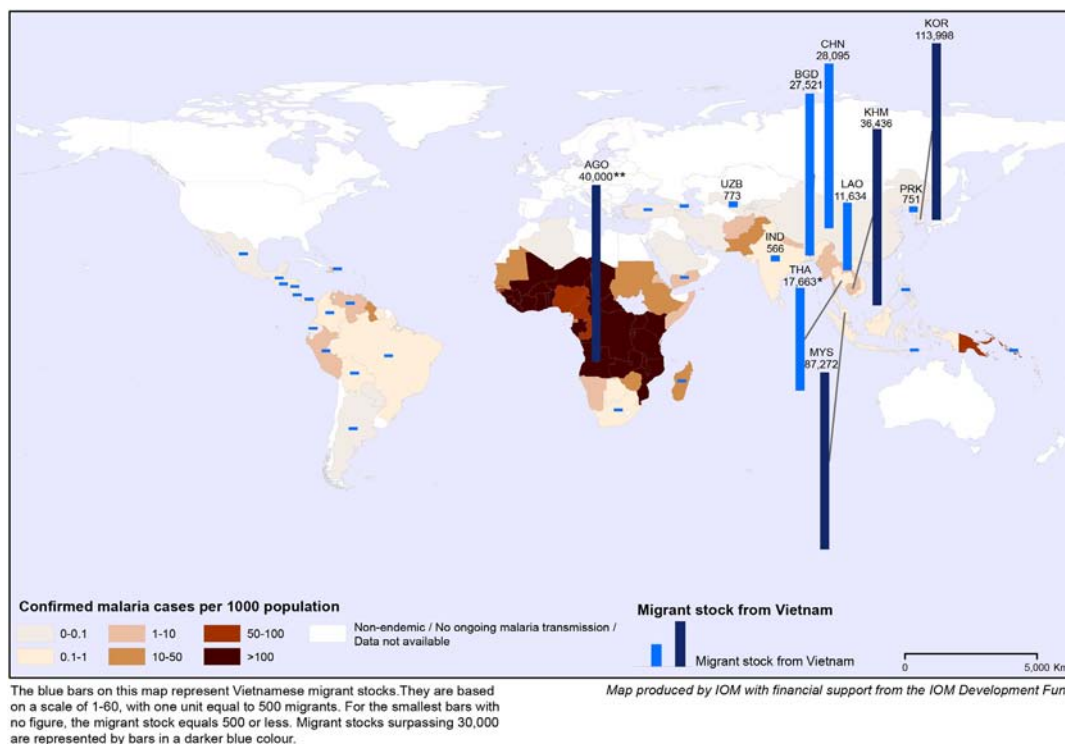
Source: Map produced by IOM based on malaria and migration data from:

Government of Viet Nam. Ministry of Health. NMCP. *Annual report 2015*. 2015.

Government of Viet Nam. General Statistics Office (GSO). 2014. Available from www.gso.gov.vn/SLTKE/pxweb/en/02.%20Population%20and%20Employment/02.%20Population%20and%20Employment/E02.22-24.px/table/tableViewLayout1/?xid=5a7f4db4-634a-4023-a3dd-c018a7cf951d. Accessed 2 May 2016.

Note: The map only shows migration data for provinces with malaria prevalence.

Map 2: Global malaria prevalence and presence of migrants from Viet Nam



Source: Map produced by IOM based on malaria and migration data from:

WHO. *World Malaria Report 2015*. Available from www.who.int/malaria/publications/world-malaria-report-2015/en. Accessed 5 May 2016.

United Nations Department of Economic and Social Affairs (UN DESA). *Trends in International Migrant Stock: Migrants by Destination and Origin*. 2013 and 2015). Available from www.un.org/en/development/desa/population/migration/data/estimates2/index.shtml. Accessed 5 May 2016.

(*) International Labour Organization (ILO). *Migration in ASEAN in Figures: The International Labour Migration Statistics Database (ILMS) in ASEAN*. 2015. Available from www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---sro-bangkok/documents/publication/wcms_420203.pdf. Accessed 5 May 2016.

(**) Thanh Nien newspaper. *Vietnamese workers in Angola under constant attack*. Article published 25 September 2014. Available from <http://thanhvien.vn/doi-song/lao-dong-viet-nam-tai-angola-lien-tuc-bi-cuop-tan-cong-456292.html>. Accessed 5 May 2016.

Note: It should be noted that the UN DESA data are based on population censuses that often fail to take into account short-term or temporary migrants who are not registered in the country they are living in. For this reason, other sources were also used when available to complete missing data or to provide more updated data. These cases are marked with asterisks (*) on the map.

There has been considerable documentation of the links between migration and the spread of malaria in the Greater Mekong Subregion, including at the Lao People’s Democratic Republic–Viet Nam border.¹⁶ Studies from the subregion show that:

Mobile and migrant populations, groups or individuals are highly vulnerable to malaria because of barriers/obstacles to access to “basic” and “quality” health-care services for both health and malaria curative and preventive services.¹⁷

Those who cross borders and live and work without documentation in neighbouring countries are also less likely to seek care due to the fear of arrest and deportation. Due to high opportunity and travel costs, they often seek care from private and unregulated vendors, which increases their risk of exposure to substandard drugs or artemisinin-based monotherapies, which in turn can lead to higher rates of drug resistance and mortality.

16 See, for example, WHO. *Malaria in the Greater Mekong Subregion: Regional and Country Profiles*. 2010.

17 WHO. *Mobile and migrant populations and malaria information systems*. 2015.

Within the province, there are a number of districts (and communes) that are proving “hotspots” for both malaria and migration.²²

- i) Bu Gia Map District in the north borders Cambodia and Viet Nam’s Central Highlands. Within this district, the communes Dak O and Bu Gia Map, which border Cambodia, are by far the most important malaria “hotspots” in Binh Phuoc Province: in 2015, the number of malaria cases in these two communes alone (701 cases in Dak O and 151 cases in Bu Gia Map) represented 88 per cent of the total number of cases in the district and 34 per cent of the total number of cases in the whole province.²³

Bu Gia Map is home to the Bu Gia Map national park and has a number of hydropower plants. Many migrants go there to find work in the formal sector as forest rangers or construction, rubber or hydropower plant workers; or in the informal sectors. According to a report by the local authorities, they are highly vulnerable to malaria: cases contracted by migrants and mobile populations may account for up to 60 per cent of the total number of cases of malaria (this is an estimate, since official data do not exist).²⁴

- ii) Bu Dang District borders three provinces: Dak Nong, Lam Dong and Dong Nai. Dak Nhou Commune in Bu Dang has the third highest rate of malaria in Binh Phuoc, with 122 cases recorded in 2015 (56% of the total number of cases in the district and 7% of the total number of cases in the province).²⁵ Dak Nhou not only attracts many migrants, but there is a recent and increasing trend of local people migrating to other districts in Binh Phuoc Province (particularly Bu Gia Map), or to other provinces (such as Tuy Duc District in Dak Nong Province), to find work in crop plantations and forested areas. The nature of this work often requires them to stay for a period of time and to sleep at the work site, which increases the risk of contracting malaria. According to a local study, 69.4 per cent of the cases of malaria recorded in Dak Nhou in 2013 and in the first six months of 2014 were “imported” cases, meaning that malaria was contracted outside the commune.²⁶ Meanwhile, Bom Bo Commune recorded seven cases of malaria in 2015, representing 3 per cent of the total number of cases in the district and 0.4 per cent of the total number of cases in the province.²⁷

The data on malaria in the three communes with the greatest number of cases of malaria (Dak O, Bu Gia Map and Dak Nhou) show that the peak period of malaria incidence clearly coincides with the high season for agricultural activities between November and April.

22 Viet Nam is administratively divided (from the top down) into provinces, districts and communes. Each commune is further divided into villages, but these are not administrative units.

23 Institute of Malariology, Parasitology and Entomology in Ho Chi Minh City (IMPE HCMC). “Report on the results of malaria, dengue, worms, and external parasites prevention and control activities in 2015 – Southern and Lam Dong area”. 2016.

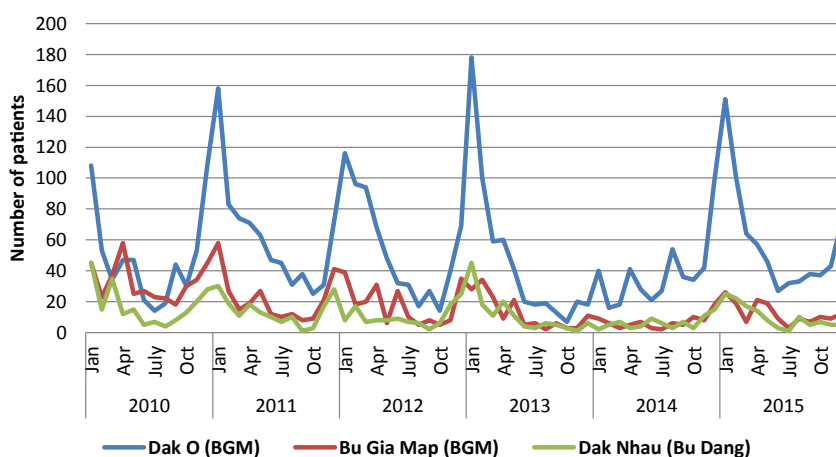
24 Binh Phuoc Department of Health, Bu Gia Map District Health Centre. Report presented at the workshop “Exchange of information on prevention of communicable diseases – Current situation of the malaria prevention and control programming for the MMP in Bu Gia Map District, Binh Phuoc Province”. 2013.

25 Binh Phuoc Department of Health. Malaria Control Center. *Malaria Report 2015*. 2015.

26 Le Huu Hoa et al. Epidemiological characteristics of malaria in Dak Nhou Commune, Bu Dang District of Binh Phuoc, 2013 and the first six months of 2014. *Journal of Malaria and Parasite Diseases Control*, 4(93). 2016.

27 Binh Phuoc Department of Health. Malaria Control Center. *Malaria Report 2015*. 2015.

Figure 2: Malaria patients in three communes in Binh Phuoc (by month and year)



Source: IOM calculations, based on Binh Phuoc Department of Health. Malaria Control Center. *Malaria Report 2015*. 2015.

iii) Finally, Bu Dop District is located at the border with Cambodia. It has the least forest coverage, and therefore the lowest risk of malaria, of the three districts selected. In 2015, the communes Phuoc Thien and Thien Hung recorded 12 and 91 malaria cases respectively, representing 6 per cent and 43 per cent of the total number of cases in the district, and 1 per cent and 5 per cent of the total number of cases in the province.²⁸ According to the local health authorities,²⁹ the people most vulnerable to malaria are those who work and sleep at crop plantation sites located near the border with, or in, Cambodia (and who are often less likely to sleep with nets or under proper roofing, thus increasing malaria risk). This group is mainly comprised of migrant workers (from other districts in Binh Phuoc or from other provinces) and to a lesser extent, the local residents who own the plantations. While other local residents may cross the border to Cambodia to work, they return within the same day, so they do not spend the night in a forested area there, and therefore have a lower risk of contracting malaria.

I.4. Rationale and objectives of the study

As we have seen, there is wide consensus that migrants and mobile populations are particularly vulnerable to malaria, in part because they are hard-to-reach with prevention and treatment interventions. In Binh Phuoc and in the wider Greater Mekong Subregion, this may be exacerbated by the specifically informal and seasonal nature of population movements.

However, there have only been a few studies that formally analyze the nexus between mobility and malaria, most of which have been small-scale. In Viet Nam specifically, there is not only a lack of behavioural studies on the relationship between mobility and malaria, but aggregated data related to migrant status is not collected as part of the monitoring of malaria-related programmes. The current data on malaria prevalence among migrants is small-scale or anecdotal. Further evidence is therefore required to enable a full analysis of mobility-related vulnerability to malaria and related issues, and to improve support for migrants.

WHO has recently re-emphasized that:

Strengthening malaria control interventions and locally managed surveillance and response mechanisms ... will remain only partially successful if [mobile and migrant populations] are neglected and not part of the malaria control and elimination equation.³⁰

28 Ibid.

29 Interview with a local health officer, Bu Dop District Health Centre, 14 January 2015.

30 WHO. *Mobile and migrant populations and malaria information systems*. 2015.

Despite such growing awareness of the importance of including migrants and mobile populations in malaria strategies:

The tendency is still to refer to migrant and mobile populations as a homogenous risk group, rather than to more clearly identify the situations in which population mobility shapes malaria transmission and epidemiology.³¹

In this context, clearer definitions and better knowledge of the specific vulnerabilities of different migrant and mobile populations will help to prioritize interventions, facilitate cross-border discussions and ensure clarity and accuracy in messaging.

IMPE HCMC, with the support of IOM and WHO, therefore undertook a study of migration and malaria in Binh Phuoc Province. As seen above, Binh Phuoc has high levels of both malaria and migration, and migrant vulnerabilities may be exacerbated by the specifically informal and seasonal nature of population movements.

The study aimed to provide additional data and analysis on human and other factors related to: exposure to and infection with malaria, prevention of malaria and the spread of resistance to malaria treatments. It is intended that the analysis will be used to improve support for malaria prevention among migrant and mobile workers in the province, and to identify opportunities for further research and programme development. The study was guided by the following key questions:

- i) Who are the migrants and mobile populations in Binh Phuoc? What are the migration flows? How long do people stay in the province? What work do they do? Where in the province do they live? How can the different mobile populations be categorized?
- ii) In what ways are migrants and mobile populations more vulnerable to malaria than members of the local population, and why?

I.5. Methodology

I.5.1. Study design

The study was conducted in two stages. First, IMPE HCMC conducted a large-scale knowledge, attitudes and practices (KAP) household survey, led by an expert epidemiologist and with assistance from WHO, between December 2014 and March 2015. The survey was conducted among respondents from migrant and mobile populations in six communes (three districts) in Binh Phuoc Province: Bom Bo and Dak Nhau (in Bu Dang District), Bu Gia Map and Dak O (in Bu Gia Map District), and Thien Hung and Phuoc Thien (in Bu Dop District). These communes were selected based on the following (already established) characteristics:

- High rates of malaria transmission (zones four/five according to the 2009 malaria zone stratification exercise)
- High rates of mobility
- High malaria-related mortality rates
- Known emergence of artemisinin drug resistance (Tier one according to a 2011 classification)
- Geographical situation in a border area (with Cambodia)
- Large population movements.

The survey focused specifically on knowledge of and attitudes towards malaria and prevention among migrants and mobile people, and their willingness (as well as that of their host communities) to use the prevention/control measures provided by the NMCP. Prior to the survey, a focus-group discussion in each of the three districts were conducted by IMPE HCMC with support from WHO. These focus group discussions revolved around mobile and migrant people, including their main activities and socioeconomic characteristics, as well as the impacts on and challenges for the host community. The participants of these discussions

³¹ Ibid.

were purposively selected to ensure each focus group included local health representatives from different administrative levels (provincial, district, commune and village), members of the communal People’s Committee, representatives of the communal police force, the officer in charge of household registration and/or the officer in charge of communication, and three migrants. The outputs of the three discussions were used to develop the questionnaire.

Following the analysis of the KAP household survey data, it was decided that a smaller-scale investigation was needed of specific issues identified in the analysis, including the categorization of different population groups in the province, and the extent to which migrants and mobile people are more vulnerable to malaria than local residents. The second stage of the project was therefore to conduct a much smaller in-depth study, led by an expert social demographer and with assistance from IOM, in Dak O Commune (one of the most malaria-prone communes in the province). This study consisted of both a quantitative in-depth study of 300 individuals that was again conducted by IMPE HCMC and included a significant qualitative component, including focus-group discussions and in-depth interviews. This was conducted by the demographer and IOM staff, to provide in-depth contextual information about respondents’ life events and attitudes. These relate to work, mobility and migration; experience of malaria; knowledge, attitudes and practices linked to malaria prevention; and other socioeconomic and cultural factors.

1.5.2. Respondent sampling methods

KAP survey (2005 respondents)

There were a number of challenges encountered in sampling respondents, including difficulties in categorizing residents. These arise from the fact that, in Binh Phuoc Province, the migrant population arrives and lives in dispersed/separated settlements and clusters; in some areas, migrants live in the same villages as local residents. In addition, many migrants only stay in Binh Phuoc during the high season for agricultural activities, while others stay in the province longer or return on an annual basis. Finally, no clear definitions were established for mobile people/migrants (see below for further elaboration on this issue). It therefore proved difficult to identify the precise number of migrant or mobile households.

Due to these difficulties, the survey team conducted the survey at work sites (plantations and forested areas) with the assistance of local health staff and/or People’s Committee staff, who were able to identify respondents based on their local knowledge and in the absence of clear definitions for each respondent category. In addition, the local staff and their networks enabled the survey team to cover a diverse migrant and mobile population, including temporary and longer-term migrants, as well as local residents and migrants who spend time in forested areas and/or crossed borders.

All the migrants and mobile people at the sites who met the age criteria (between 15 and 70 years), and who had been in the commune for at least one month prior to the survey date, were interviewed, until the desired sample size (2,000 respondents) had been reached.³² It should be noted that the end sample size was 2,005 respondents.

Table 2: Distribution of respondents among the six targeted communes

District	Commune	Number of respondents	Percentage (%)
Bu Gia Map	Dak O	416	21
	Bu Gia Map	254	13
Bu Dang	Dak Nheu	366	18
	Bom Bo	302	15
Bu Dop	Phuoc Thien	403	20
	Thien Hung	264	13
Total		2,005	100

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

³² If there were several eligible participants in one household, only one household member was interviewed.

In-depth survey (300 respondents)

The need for an in-depth and smaller study as described above led to the deliberate sampling of three groups of people in Dak O Commune:

- i) 150 respondents were randomly selected from 150 non-migrant households using stratified sampling methods: three villages (villages three, four and ten³³) were randomly selected, with the probability of selection proportional to the village size; then 150 households were randomly selected from the list of all households registered with the local police in these three villages using systematic random sampling. The head of each of the 150 households was interviewed if available at the time of the interview, otherwise another member of the household who was available and capable of providing information was interviewed.
- ii) 50 malaria patients were identified based on the commune health centre's list of all people who came to seek treatment for malaria in the 12 months between August 2014 and August 2015 (when the survey took place). These patients include both migrants and local residents, as well as all the former patients who could be reached. Unfortunately, there is no systematic collection of patient contact details and where these were available, many former patients could not be contacted because the details were incorrect or because the individual was not present in the commune at the time of the study. The sample also includes people who contracted malaria during this 12 month period and were referred to the survey team during the survey process (in August 2015). This time frame was selected in order to ensure sufficient recent malaria cases for statistical analysis, given the small sample size of the in-depth study.

The vast majority of the patients on the list provided by the commune health centre had provided a residential address in Dak O Commune, despite the fact that many of them are likely to have come from other provinces.³⁴ In addition, since the contact details for patients were often either incomplete or inaccurate, the survey team had to rely on local knowledge and could only gain access to people known by their local guide who – in most cases – were local residents. As a result, of the 50 patients selected for the quantitative sample, only five patients were not officially permanent residents in the commune (see below for an explanation of the household classification system). This means that the inclusion of these 50 patients risks making the sample highly biased towards malaria incidence among the non-migrant population in certain analysis. Where this occurs, it will be made explicit and explained.

- iii) 100 migrants were identified by local facilitators (village leaders/village health workers/plantation supervisors), at their places of work in cultivated forests, plantations or "ray", at the time of the survey. These respondents include all the migrants identified, as due to time constraints, the in-depth study was conducted during low migration season, and it was therefore difficult to find migrants/mobile people.

Note:

- The final sample included 50 malaria patients (11 women and 39 men), 151 randomly selected respondents (57 women and 94 men), and 99 migrants (32 women and 67 men). The slight divergence from the original design is due to the fact that the survey team was divided into several groups conducting interviews simultaneously at different sites.
- Of the 300 respondents in the final sample, 137 respondents (45.7%) reported ever having had malaria. Of these respondents, 20 per cent of them had malaria between 1992 and 2009. In order to minimize recall bias, only those respondents who reported having had malaria between 2010 and 2015 were included in the analysis of malaria incidence.

³³ These three villages were selected out of a list of 12 villages in Dak O by random method based on the number of households in each village and the average size of household. In total, the three villages include 753 households with 4,016 household members, out of a total of 3,326 households with 14,626 household members in Dak O Commune.

³⁴ It is not clear whether the address provided by people who seek treatment is their permanent or temporary address – especially in the case of migrants. In addition, according to the local health authorities, migrant patients tend to report their temporary address in Dak O out of an incorrect fear that they will not receive free treatment if they are not locally resident. This means that they appeared as local residents on the health centre list.

1.5.3. A note on the definition of migrants and mobile populations

The KAP survey used four categories to classify groups of migrants/mobile populations for its analysis: “forest/field goers”; “border-crossers”; “seasonal workers”; and “regular workers”. However, because no specific definition of each category was elaborated, difficulties arose during classification – particularly as some people might belong to two (or more) of these categories.

In order to address this challenge, the in-depth study questionnaire included two questions about residence status:

- Length of time for which the respondent has lived continuously in the commune;³⁵
- Formal household registration classification.³⁶

These two questions captured several different dimensions of migration. Some people might be registered as KT1 in the commune, but only spend short periods of time there because they migrate, for various reasons, to other places on a regular basis. Others who are officially classified as migrants (KT2/KT3/KT4) might have lived in the commune for a long time and are considered to be fully integrated into the local community. Some respondents may not have a registered status, either because they only stay in the commune for a very short time, or because they have not been able to complete the required formalities.

In any case, in the context of malaria, official KT status may be less relevant than the duration and purpose (occupational activity) of residence in a commune. Therefore, for the in-depth study analysis, the duration of continuous stay in Dak O Commune was used for the classification of migrants:

- Those who had resided continuously in the commune for six months or less were classified as “mobile migrants”;
- Those who had resided continuously in the commune for more than six months and up to one year were classified as “short-term migrants”;
- Those who had resided continuously in the commune for more than one year and up to five years were classified as “long-term migrants”;
- Those who were born in the commune or had resided there continuously for more than five years were classified as “local residents”.

This classification was applied retrospectively to the data analysis for the KAP survey and to the analysis of the in-depth study data. As noted previously, the KAP survey question on length of residence did not allow for a distinction between respondents who had lived continuously in the commune for between one and five years (“long-term migrants”) and those had done so for more than five years (“local residents”). Therefore, for the purposes of reclassification, the data from the KAP survey on place of birth was used to distinguish between those born in a given commune – “local residents” – and those born outside a given commune – “long-term migrants”. It should be noted that this KAP reclassification only reflects mobility at the commune level (such as between communes) and not within communes: a household may have both a primary and secondary residence in the same commune.³⁷

1.5.4. Survey methods, data entry and verification and ethical considerations

Data collection for the KAP survey was conducted between December 2014 and March 2015. Prior to the roll-out of the survey, the interviewer-administered questionnaire was tested with a pilot group of 12 respondents, all of whom were mobile people or migrants, and who were selected randomly from a list provided by the local police force.³⁸ The results of the pilot were used to adjust the questionnaire.

35 This question provided four options: up to six months; between six months and one year; between one year and five years; over five years. The question on length of residence in the KAP questionnaire only provides the first three options.

36 Four categories exist. See table 18.

37 See section 2.2.2 for further discussion of this point.

38 For the purposes of the focus groups, both mobile people and migrants were defined as people who had not been recorded as permanent residents by the local police.

The interview team included IMPE HCMC staff, province/district/commune health centre staff and a village health worker and/or village leader serving as a local guide. These local guides also provided assistance with translation for ethnic minority respondents, where necessary. The team members conducted face-to-face interviews with respondents at their work sites or in their homes.³⁹ Data entry and data verification were undertaken by IMPE HCMC between March and April 2015.

Data collection for the in-depth study was undertaken by IMPE HCMC, the expert social demographer and IOM in August 2015. The first day of the field survey was used as a pilot: six questionnaires were completed, following which the questionnaire was reviewed and adjusted in line with the local context, including through the addition of further instructions, by the research team in the field. The data entry and verification were completed in September 2015.

The members of the survey team were trained to take GPS coordinates, and to record data. For both the KAP and in-depth surveys, they recorded the GPS coordinates of each interview location, which in most cases was the respondent's worksite and/or residence. For the in-depth survey, the survey team received additional support from IOM and a GPS expert to capture the work-related movements of the respondents. They asked respondents to provide the direction and estimated distance from the interview site of their current worksite or of places they had worked in the past.⁴⁰ The direction was recorded by the team in degrees (with the aid of an electronic compass) and the distance in kilometres and the GPS expert plotted the movement on a map on the basis of this information. Although the team intended to capture all work-related movements for each respondent within the previous 12 months, the complexity of the exercise and the limited time allocated for each interview meant that only one such movement (where such had occurred) was actually captured for each respondent. The GPS expert also assisted with the verification of the geo-coded data from both surveys. All of the final GPS maps in this report were produced by IOM, with additional technical assistance from a consultant.

All respondents in both surveys were informed about the objectives, methods, risks and benefits of the surveys, provided informed consent to take part in the interviews on a voluntary basis, and were offered the possibility to stop the interview at any time. All of the information gathered was kept confidential.

1.5.5. Limitations

The major challenges of the study – the need for further investigation of the KAP survey results through an in-depth study, and the need to reclassify the sampled populations – are described above. Both of these challenges were addressed to a certain extent by the in-depth study. However, there were further limitations.

Firstly, the lack of reliable data on migrants and mobile populations, due to irregular and short-term movements and the fact that many of these people live/work in hard-to-reach locations, meant that undertaking probability sampling was not feasible. Both the KAP survey and the in-depth study faced the significant practical challenge of ensuring a representative sub-sample of the migrant population in Binh Phuoc. Neither study was able to overcome this challenge, because there was no way to establish a reliable sampling frame. Systematic random sampling was not possible for the identification of mobile and migrant respondents, because there was no way of obtaining an exhaustive list of migrants present at the research sites due to temporary movements, irregular and short-term migration. This also made it very difficult to estimate how many migrants were living in the research sites at any given time. While systematic random sampling was used to identify “non-migrant” households, therefore, both surveys used convenience sampling to select migrant respondents – for example the interviewers interviewed anyone they believed to be relevant (a migrant/mobile person). This means that neither the KAP sample nor the migrant sub-sample of the in-depth survey are representative. There is a risk of:

39 Migrants may live in tents at the work site or in houses/tents away from the work site. Migrant households may consist of single migrants travelling alone, or of a migrant and his/her accompanying family members.

40 Depending on whether the interview site was the respondent's residence or worksite.

- Selection bias – both on the part of the interviewer/local contact, and because the team only reached out to those who were working in the commune at the time of the surveys (December 2014 to March 2015 for the KAP survey and August 2015 for the in-depth survey). Because the number of migrants/mobile people varies greatly within a year, these may not have been the most opportune times to interview people. In addition, it was very difficult to reach certain migrants in hard-to-reach sites, such as those deep within forests.
- Sampling errors (a respondent might not be a migrant at all).⁴¹
- Duplication of respondents (the same respondent might be interviewed twice by two interviewers) – further data verification found that this did not apply in this case.⁴²

In addition, the sub-sample of 50 malaria patients in the in-depth study is also not representative, since the survey team had to rely on local guides to identify which patients they could reach out to (see section 1.5.2, above). The findings related to migrants and mobile people in both studies, and former patients in the in-depth study, should therefore be interpreted with caution.

Secondly, the question on malaria incidence in the KAP survey referred only to respondents' lifetime experience ("ever had malaria"), with no more specific time reference. Since we therefore do not know whether a respondent contracted (and was treated for) malaria within the last year or a long time ago, and there have been major changes in both the patterns of malaria prevalence and national programming, any specifically illness-related analysis would not be meaningful. The relevant data have therefore not been included in this report.

The definition and categorization of occupations in relation to malaria risk also presented a challenge. For example, people living in Dak O often have multiple livelihood activities – either simultaneously (for example people working on "ray" near the forest may also work in the forest to generate additional income), or seasonally (such as those who work on cassava farms, then cashew-nut farms, then rubber plantations, as the growing and harvesting seasons change). Meanwhile, the same "type" of agricultural work may involve different processes, and people engaged in these different processes may have different levels of exposure to malaria. As neither study was able to effectively define and classify occupation-related malaria risk, this is not analysed in this report.

Finally, the data collection for the in-depth study took place in August 2015, which is the low season for migration. This meant that it was not possible to collect data from some of the preponderant migrant groups, such as those working on cassava/cashew crops. The in-depth study was also limited to Dak O Commune, with a small sample size. Interpretation of the findings must therefore be placed in the commune context. In addition, the small sample size meant that although the individual ethnic minority of each respondent was noted, for the purposes of the analysis the numbers are too small to distinguish between ethnic groups other than the majority Kinh and "ethnic minorities" as a single entity.

41 In the KAP sample, 4.4 per cent of mobile migrants (21 of 480) and 12.7 per cent of short-term migrants (8 of 63) were born in the surveyed communes and may therefore not be migrants; 11.1 per cent (11 of 99) of the respondents in the migrant sub-sample of the in-depth survey are in this category.

42 Only four pairs of records in the KAP sample were found to have the same name of respondent, year of birth and name of commune. However, as these eight records differed in many other important respects, they were considered unique and retained in the final dataset.

2. RESULTS

A note on the integration of the KAP and in-depth survey results

For ease of reading, the main data and findings from the KAP and in-depth surveys are presented separately. However, as outlined above, the in-depth survey was designed to supplement and clarify the KAP survey results. The data from the two surveys are therefore complementary. Therefore, where the findings from the in-depth survey (particularly the qualitative interviews with respondents) help to shed light directly on the findings of the KAP survey, these have been included in section 2.1. Supplementary information from the in-depth survey is covered in section 2.2.

2.1. Findings from the KAP survey in six communes

2.1.1. Geographical distribution and general socioeconomic characteristics of the respondents

The sample group provided good representation of a range of respondents. There were more men than women interviewed, particularly among migrants and mobile people; more people who have ever been married than people who have not; and more Kinh people than ethnic minorities, apart from in the local resident group of whom the majority were Stieng (one of the major ethnic minorities in Binh Phuoc). The highest level of education completed by the majority of respondents was lower secondary level. Local residents have the lowest education levels, with most having completed the primary level as their highest attainment. Between approximately 50 per cent and 70 per cent of respondents in all groups, except the local residents, have a monthly income of between 3 and 5 million Viet Nam Dong (VND), which is relatively high, given that the official minimum wage in 2015 was VND 2,150,000. This is an important reason for the high rate of migration to Binh Phuoc Province. The percentage of respondents who have at least one child under five years of age is highest among long-term migrants and local residents (41.5% and 61.8% respectively), although short-term and mobile migrants also reported having young children. However, it is not clear whether any of these children actually live with the respondents. Reported lifetime malaria incidence is also highest among long-term migrants (32.6%) and local residents (29.2%). The lower rate of malaria incidence among mobile and short-term migrants might be associated with shorter periods of exposure.

Table 3: General characteristics of respondents in KAP survey (full sample) (%)

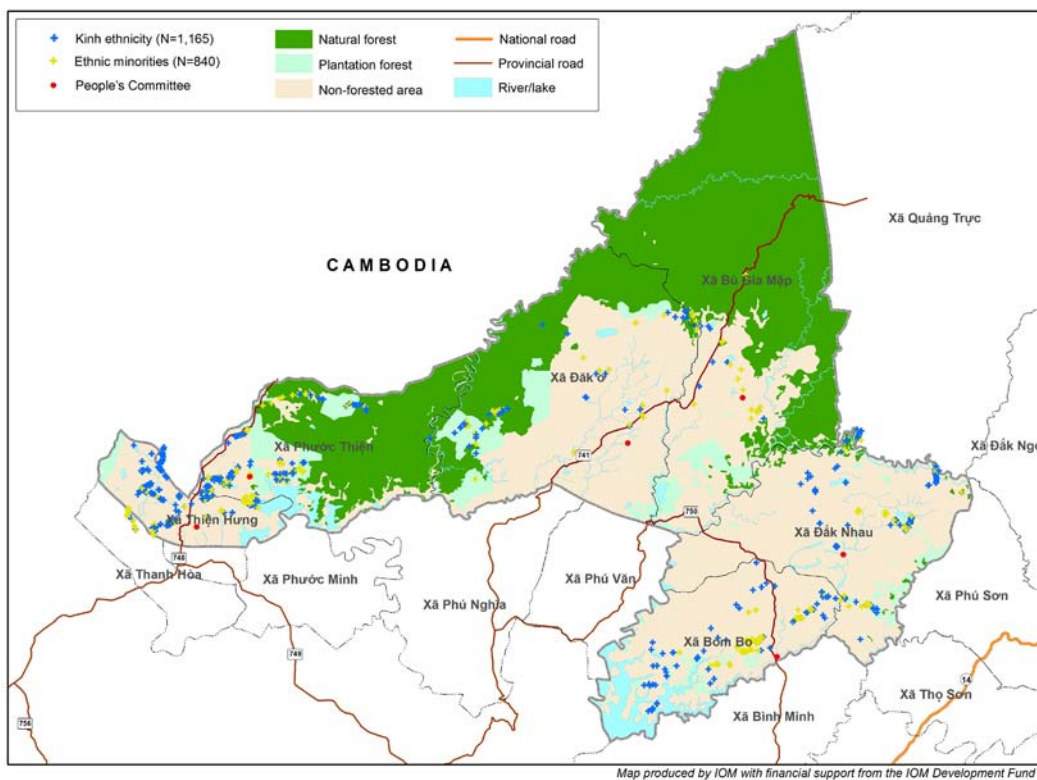
	Mobile migrants (N=480)	Short-term migrants (N=63)	Long-term migrants (N=1250)	Local residents (N=212)	Total (2005)
Sex					
Male	69.0	74.6	64.6	53.8	64.8
Female	31.0	25.4	35.4	46.2	35.2
Age group⁴³					
15–29	41.9	30.2	23.0	46.7	30.3
30–39	25.8	41.3	34.6	30.2	32.3
40+	32.3	28.6	42.3	23.1	37.5
Marital Status					
Married	67.9	74.6	87.2	80.7	81.5
Single	31.3	23.8	10.2	18.4	16.5
Divorced/widowed or separated	0.8	1.6	2.6	0.9	2.0
Ethnicity					
Kinh	67.7	66.7	60.5	19.8	58.1
Stieng	17.1	12.7	13.7	50.0	18.3
M'ngong	1.0	0.0	1.0	29.7	4.0
Khmer	4.8	7.9	1.5	0.5	2.4
Other	9.4	12.7	23.4	0	17.2
Education					
Illiterate	17.1	12.7	14.8	34.9	17.4
Primary	26.0	31.7	34.4	35.8	32.5
Lower secondary	39.8	34.9	37.7	21.7	36.4
Upper secondary	16.0	14.3	11.1	7.1	12.0
Higher education	1.0	6.3	2.0	0.5	1.7
Respondent monthly income					
Under VND 3,000,000	23.8	39.7	25.2	60.9	29.5
3,000,000 to 4,999,999	70.4	51.7	60.2	34.0	59.5
5,000,000 or more	5.9	8.6	14.7	5.1	11.0
Having children under 5⁴⁴					
Yes	15.8	23.8	41.5	61.8	37.0
Ever had malaria					
Yes	13.8	20.6	32.6	29.2	27.4

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

43 These age ranges were defined according to the distribution of age clusters in the sample, and according to international norms (0, 1–4, 5–9, 10–14, 15–19, 20–24, 25–29, etc). The research team also took into account two other criteria: (i) there must be a big enough sample of mobile, migrant and local resident respondents in each age range for the purpose of analysis (mandatory criterion); and (ii) each age range must represent a distinct socioeconomic characteristic: for example, members of the youngest age range are normally single or newly married; those in the middle age range are usually married with children aged 5 or above; and those in the oldest age range usually have older children (non-mandatory criterion).

44 It is not clear whether these children are living with the household.

Map 5: Geographical distribution of respondents in KAP survey by ethnicity

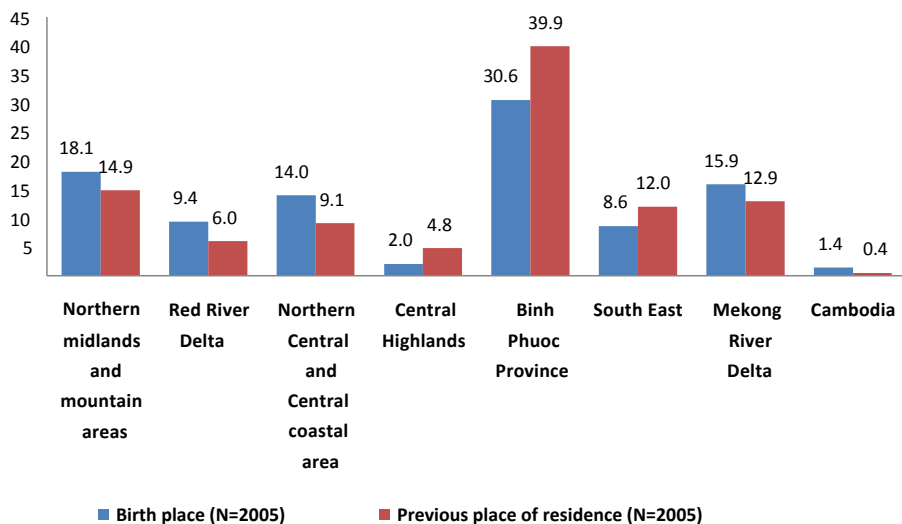


Source: Map produced by IOM based on the IMPE HCMC KAP survey 2014–2015.

2.1.2. Migrant provinces/countries of origin and ties with provinces of origin

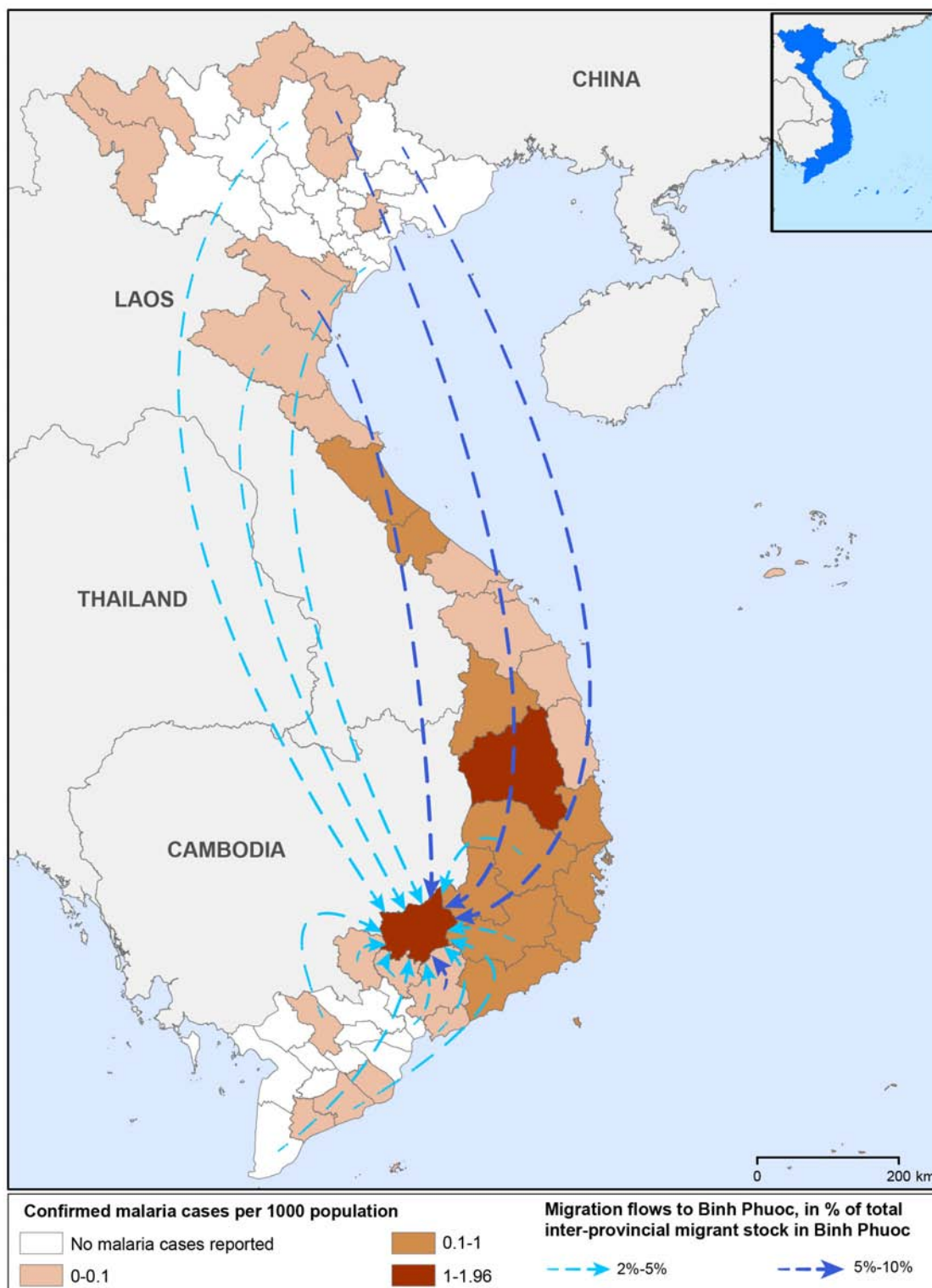
The data show that migrants to the six study communes in Binh Phuoc come from across Viet Nam: the only provinces not represented were Dien Bien, Lai Chau, Ninh Thuan, Phu Yen and Yen Bai (see figure 3 and map 6 below). Of all the respondents (in all groups), only 30.6 per cent were born in Binh Phuoc Province. However, 39.9 per cent of respondents came to the commune in which they were interviewed from other places in Binh Phuoc Province, which indicates a pattern of intraprovincial (short-distance) migration. In addition, 29 respondents were born in Cambodia.

Figure 3: Migrant origin – birthplace and previous place of residence



Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

Map 6: Provinces in Viet Nam with malaria prevalence and flows of migrants to Binh Phuoc



Source: Map produced by IOM based on 2015 malaria and migration data from: Government of Viet Nam. Ministry of Health. NMCP. Annual report 2015. 2015. The IMPE HCMC KAP survey 2014–2015.

Note: The KAP survey sample contained 1,205 interprovincial migrants (migrants who travelled into Binh Phuoc from other provinces), who represented 60.1 per cent of the total migrant population in the sample (the others migrated within Binh Phuoc Province). These migrants come from almost all over Viet Nam (only five provinces, namely Dien Bien, Lai Chau, Ninh Thuan, Phu Yen and Yen Bai, had not provided any migrants to Binh Phuoc in the sample). This map only shows the most significant migration flows (those that show the movement of at least 2 per cent of 1,205 people).

The overwhelming majority of both mobile and short-term migrants travelled to Binh Phuoc for work, with only five mobile migrants and one short-term migrant moving to resettle. Meanwhile, 52.3 per cent⁴⁵ of long-term migrants had resettled there, with the rest moving for work.

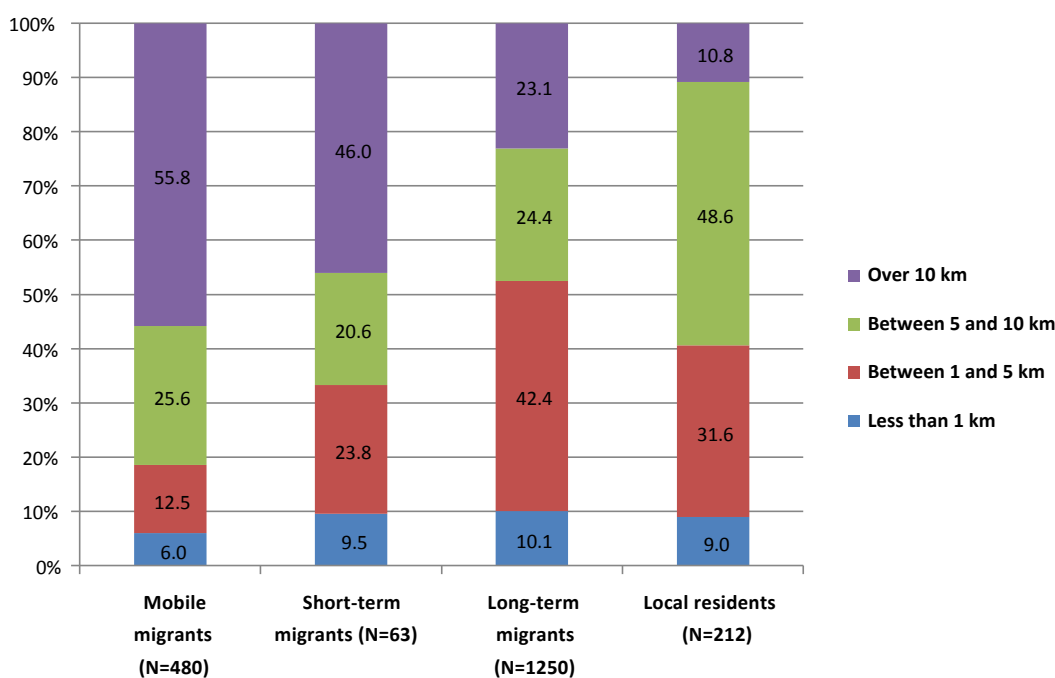
Mobile migrants maintain the closest ties with their province of origin: 66 per cent return home at least every six months, compared to 55.2 per cent of short-term migrants and 21.8 per cent of long-term migrants.⁴⁶ A total of 44 per cent of long-term migrants go home on a yearly basis, while 26.7 per cent of mobile workers and 27.6 per cent of short-term migrants plan to do so.

2.1.3. Access to services and information

2.1.3.1. Access to health services

More long-term migrants and local residents than other respondents live close to a health facility, with over 40 per cent in both groups reporting that they lived within five kilometres of such a facility compared to 33.3 per cent of short-term migrants and less than 20 per cent of mobile migrants (see figure 4). At the same time, the proportion of mobile and short-term migrants who reported living over 10 kilometers from a health facility is more than double that among both long-term migrants and local residents.

Figure 4: Distance to the nearest health facility



Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

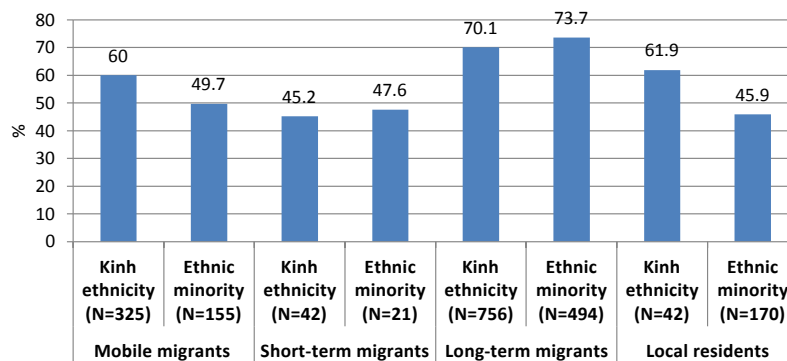
Long-term migrants also seem to have the best access to services provided by village health workers (VHW): 71.5 per cent of long-term migrants reported living in a village that has a VHW, while only 56.7 per cent of mobile migrants, 46 per cent of short-term migrants and 49.1 per cent of local residents did so (see figure 5). There is a noticeable difference between people of Kinh ethnicity and ethnic minorities among mobile migrants and local residents, with considerably more Kinh respondents (60% or more) than ethnic minority (less than 50%) reporting living in a village with a VHW. It should be noted that it is possible to live in a village and be unaware that there is a VHW there: analysis of the in-depth data showed that only 40.7 per cent of the respondents⁴⁷ reported living in a village with a VHW, although all three of the villages studied actually have one. The remaining respondents said either that there was no VHW (19.2%) or that they did not know whether there was one (40.1%). This lack of knowledge about local health services means that the majority of respondents have restricted access to them.

45 N=1250.

46 Mobile migrants: N=480; short-term migrants: N=58 (5 missing cases); long-term migrants: N=1183 (67 missing cases).

47 N=297.

Figure 5: Respondents who reported living in a village with a village health worker by ethnicity of respondent



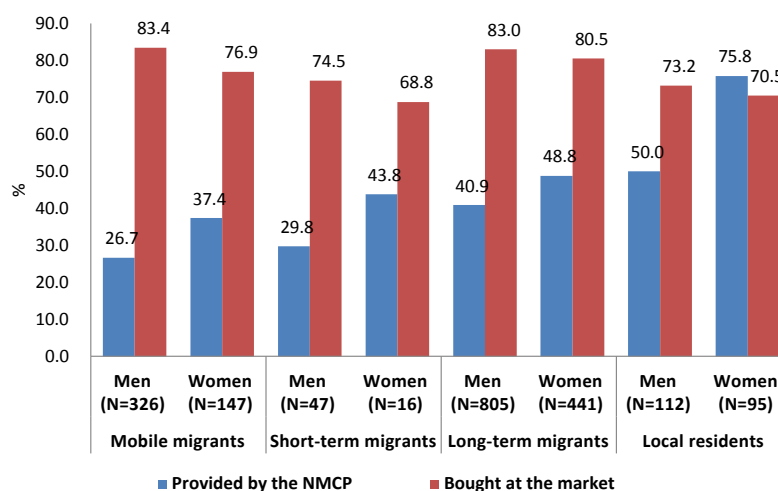
Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

2.1.3.2. Access to effective malaria-prevention services: mosquito nets and insecticides

In Viet Nam, the NMCP distributes insecticide-treated bed nets (ITNs) via district and commune health staff. Individuals can also buy their own mosquito nets and receive support from the NMCP to get these treated with insecticides by a health worker.

Figure 6 shows the source of respondents' mosquito nets.⁴⁸ More men than women reported buying (presumably non-insecticide-treated) nets at the market, and more women than men obtained (insecticide-treated) nets from the NMCP. Mobile migrants were least likely to receive NMCP nets, followed by short-term migrants; long-term migrants and local residents were more likely to have obtained such nets. A very small proportion⁴⁹ of respondents chose "other" sources, including the army, employers and relatives.

Figure 6: Source of mosquito net by migration status and sex (N=1989)



Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

During the in-depth study interviews, some respondents (more men than women) complained that the NCMP ITNs are not of sufficient quality, and are too small for a large family.

The commune provides ITNs for free, twice a year. But the material used to make the net is not good, it's not soft and the netting is so big that small mosquitoes can get inside. We used to use it for catching fish.

24-year-old man, Stieng ethnic group. Interview, in-depth study.

48 Nearly 100 per cent of respondents reported owning a mosquito net; see below.

49 13 respondents: 1 mobile migrant and 12 long-term migrants.



This insecticide-treated net, provided by the NMCP through the commune, is too small, not soft enough and the netting is too large to keep out small mosquitoes (Photo credit: Vu Manh Loi).

Other respondents in the in-depth study also reported that the local authorities sprayed insecticides throughout the commune to protect people from mosquitoes. However, opinion was mixed on the effectiveness of this method:

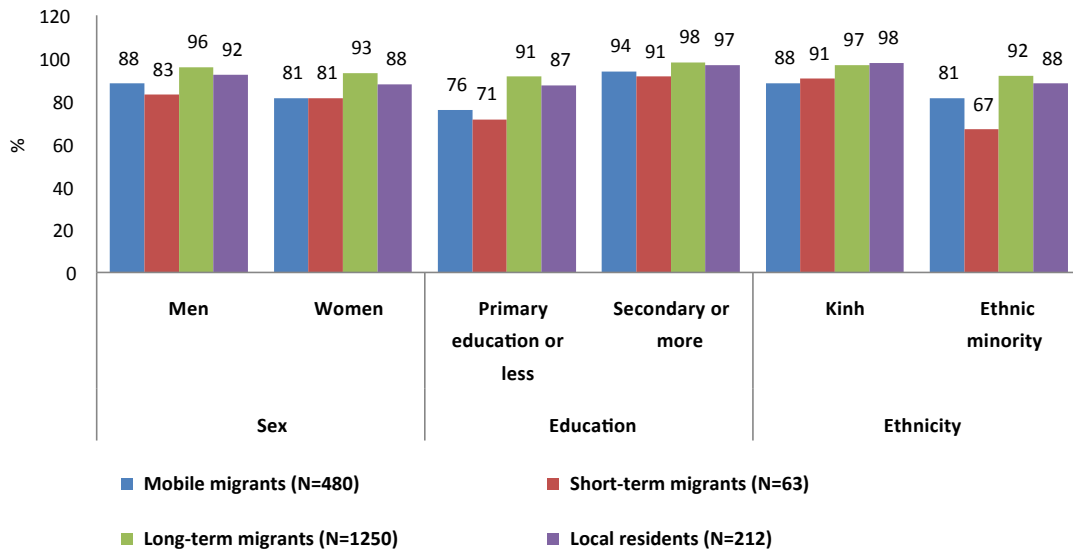
In the past [1992–2000], public health workers sprayed twice a year. They sprayed all the areas around the houses, they did it very well – the smell stayed for a while after the spraying! Now, I don't know why, they do it less. Last year they only sprayed once, and only along the main road. People in many of the villages couldn't benefit. It seems like they did it as a formality, or for fun: they sprayed on the road, far from the edges, so the chemical spray couldn't even reach the bushes. Even the chemical treatment of mosquito nets has reduced. Before they did it once a month; now I'm living in Dak Lim village, at the centre of the commune, but they haven't even sprayed the nets once since the beginning of the year.

Primary school teacher. Interview, in-depth study.

2.1.3.3. Access to information about malaria

Figure 7 shows the proportion of respondents who had ever heard of malaria by sex, education and ethnicity.⁵⁰ Generally speaking, the long-term migrant and local resident groups have the highest proportions of members who had ever heard of malaria, while in all groups: men appear to have higher levels of awareness than women; those with secondary education or above have higher levels of awareness than those with lower levels of education; and Kinh people have higher levels of awareness than ethnic minority people. It is possible that the lower levels of awareness among short-term and mobile migrants are linked to both their short period of residence in the province (they may not have been reached by communication efforts) and the fact that they may have come from a non-endemic area.

Figure 7: Proportion of respondents who have ever heard of malaria by sex, education and ethnicity



Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

Logistic regression of the data was undertaken (see table 4), which showed that three variables are significant predictors of respondents having heard of malaria. Firstly, the more education a respondent has, the more likely it is that s/he has ever heard of malaria (all else being equal). The probability (odds ratio) of respondents who have not completed the upper secondary level having heard of malaria is very low in comparison to that among people who have completed the upper education secondary level or higher. Secondly, the probability (odds ratio) of having heard of malaria among respondents who reported having a village health worker in their village is 6.182 times that among those who said that there is no village health worker in their village, all else being equal. This finding suggests that village health workers have an important role in raising awareness about malaria. Thirdly, length of residence is also an important predictor of awareness about malaria. Mobile and short-term migrants are much less likely to have ever heard of malaria than local residents, and there is no significant difference between the probability of long-term migrants and local residents having ever heard of malaria. Finally, sex, age, marital status, ethnicity, and income do not appear to impact significantly on malaria awareness. There are no statistically significant differences between men and women, Kinh and ethnic minority people, people from different age groups, married and single people, and rich and poor people in terms of the probability of having ever heard about malaria.

50 This is question 16 on the KAP questionnaire: “Have you ever heard of malaria?” which is connected to specific questions on malaria knowledge.

Table 4: Multivariate analysis – logistic regression: Respondents who have ever heard of malaria

Sex	
Male	1.137
Female	1
Age	
15–29	0.842
30–39	1.324
40+	1
Education	
Illiterate	0.066***
Primary	0.143***
Lower secondary	0.329*
Upper secondary+	1
Marital status	
Single	0.914
Ever married	1
Ethnicity	
Kinh	1.326
Ethnic minority	1
Monthly income (VND)	
Under VND 3,000,000	1.46
3,000,000 to 4,999,999	1.845
5,000,000 or more	1
Village health worker reported in village	
No	0.149***
Yes	1
Migration status	
Mobile migrants	0.296***
Short-term migrants	0.259**
Long-term migrants	0.731
Local residents	1

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

Note: This table presents odds ratios. For each variable (for example level of education), there is a reference category with an odds ratio of one (in this case, the highest level of education is the reference category). The odds ratio for the other categories was calculated by dividing the likelihood of having heard of malaria by the likelihood of not having heard of malaria, compared to the reference category (where the odds ratio=1).

Where the odds ratio for a category is less than one, it means that respondents were less likely to have heard of malaria than respondents in the reference category. Where the odds ratios for a category is greater than one, respondents were more likely to have heard of malaria than those in the reference category.

The statistical significance of these odds ratios is indicated by the use of asterisks (*). Where the odds ratio does not have an asterisk, it is not statistically significant. Where an asterisk is present, the difference is statistically significant (such as when there is little chance that the difference is merely a random outcome). One * indicates that there is a 95 per cent chance that the difference is not random; two ** indicates that there is a 99 per cent chance that the difference is not random; and three *** indicates that there is a 99.9 per cent chance that the difference is not random.

For example, the odds ratio for the “Illiterate” category under the “Education” variable is 0.066 with three asterisks. This means that, compared to those with upper-secondary education or higher education (the reference category), illiterate respondents were only 0.066 times as likely as respondents in the reference category (other variables in the model being equal) to have heard of malaria, and this difference is statistically significant (there

is an 0.01% chance that it is a random result). This can also be expressed as a percentage: illiterate respondents were only 6.6 per cent as likely to have heard of malaria as people with upper-secondary education or higher.

Respondents who had heard about malaria were asked to identify the source(s) of this information.⁵¹ As can be seen in table 5, TV and radio were the two most common sources, followed by health workers. It should be noted that short-term migrants were particularly likely to say they had received information from health workers, possibly because they have lived in the commune long enough (between six and twelve months) to be contacted by health workers or to seek them out themselves. As mobile migrants only spend a very short period of time in the commune, health workers may not be able to reach them, which would explain the lower proportion of mobile migrants citing health workers as a source of information. Family members, neighbours and newspapers are also important sources of information among all groups.

Meanwhile, it appears that billboards, brochures and leaflets reach limited numbers of both men and women in all groups. Schools and pharmacies also seem to be relatively unimportant sources of information about malaria – which is unsurprising in the case of schools, as the respondents are adults.

There are clear gender differences in the sources of information. Family members and neighbours appear to be more important sources of information for women than for men among mobile migrants, while the pattern is reversed in the three other groups. The radio is considerably more effective among women than men in the short-term migrant group, as are newspapers among locally resident women. TV seems to be a particularly effective source of information for mobile and short-term migrant women, both in and of itself and compared to men in these groups. The impact of health workers is mixed: more mobile and long-term migrant men than women in these groups cited them as a source of information, while more short-term migrant and locally resident women than men did so.

Table 5: Sources of information about malaria among those who have heard of malaria (N=1840) (%) (multiple-choice question)

	Mobile migrants		Short-term migrants		Long-term migrants		Local residents	
	Men (N=292)	Women (N=121)	Men (N=39)	Women (N=13)	Men (N=772)	Women (N=412)	Men (N=105)	Women (N=86)
Family member	22.3	33.1	23.1	7.7	17.4	15.3	17.1	5.8
Neighbour	15.8	37.2	15.4	7.7	19	14.8	16.2	11.6
Radio	44.9	30.6	35.9	53.8	55.2	48.8	34.3	20.9
TV	61.3	63.6	56.4	69.2	54.9	47.6	50.5	45.3
Newspapers	23.6	11.6	20.5	7.7	13.5	9.2	3.8	9.3
Posters/ pamphlets/ leaflets	5.1	0.8	7.7	15.4	8.3	6.1	5.7	2.3
School	3.4	1.7	2.6	0	2.3	0.7	4.8	1.2
Health worker	29.1	20.7	38.5	53.8	39.1	35.2	41	51.2
Pharmacy	3.1	0	0	0	0.6	0.7	1	0

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

Note: Only six respondents chose the “other” options, none of whom could identify/remember the source of information.

51 Question 28 of the KAP questionnaire: “Have you ever heard or received any information about malaria?” If the answer was yes, respondents were given a range of options of which they could choose more than one, and identify others if they were not in the list.

Table 6: Proportion of respondents who have heard of malaria who correctly identified facts about malaria (N=1840) (%)

Correct answer	Mobile migrants		Short-term migrants		Long-term migrants		Local residents		Avg.
	Men (N=292)	Women (N=121)	Men (N=39)	Women (N=13)	Men (N=772)	Women (N=412)	Men (N=105)	Women (N=86)	
Only mosquito bites cause malaria infection	79.5	73.6	64.1	61.5	76.2	82	81.9	76.7	77.8
Malaria can be fatal if not treated properly	89	81.8	89.7	61.5	91.7	87.4	85.7	81.4	88.6
Everybody is at risk	78.1	71.9	53.8	61.5	51.4	43.4	63.8	57	56.3
Symptoms of malaria infection (correctly identified the two most common symptoms)	65.8	62	53.8	30.8	75.1	69.4	63.8	46.5	68.8
Malaria is preventable	89.4	80.2	76.9	69.2	88.5	87.1	78.1	73.3	86.1
Correctly identified at least four of these five facts	75	68.6	53.8	38.5	69.7	66.3	67.6	61.6	68.6

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

However, although the above indicates that men have better knowledge about specific aspects of malaria than women, a multivariate analysis of the data showed that gender was not a significant predictor of such knowledge. Table 7 shows the results of this analysis of a number of variables. The dependent variable is “level of knowledge of malaria”.⁵³

Model 1 examines the role of key personal characteristics, migration status, and the number of sources of information about malaria to which respondents have access. This model shows that a respondent’s level of knowledge about malaria depends primarily on their level of education, marital status, migration status, and the number of sources of information sources they have access to. While there is no significant difference in levels of knowledge between those who have completed lower secondary education and those who have completed upper secondary education, these respondents are significantly more knowledgeable about malaria than those who have only completed primary education, and even more so than illiterate respondents. Married people have better knowledge than single people. Short-term migrants have significantly lower levels of knowledge than local residents, while long-term migrants are more knowledgeable about malaria than short-term migrants, but less so than local residents. There is no statistically significant difference between local residents and mobile migrants, which is surprising. It is possible that the mobile respondents interviewed have been travelling to and from the province for a long time, and they are classified as mobile because their most recent continuous residence there has been short. Meanwhile, short-term migrants do have lower levels of knowledge about malaria than other respondents. Finally, those respondents who have access to more sources of information are significantly more knowledgeable about malaria than those who have access to fewer sources of information, all else being equal. Sex, age, ethnicity, income, and having children under the age of five (or not) do not have any significant effects on the level of knowledge of malaria, all else being equal. In other words, there is no significant difference between men and women, Kinh and ethnic minority people, among income groups, or people with or without children under five in the household, all else being equal.

Model 2 examines the role of specific sources of information in increasing knowledge about malaria (as opposed to the number of sources of information). This model again shows that education level, marital status and migration status are important predictors of respondents’ level of knowledge about malaria. It also shows that family members, neighbours, radio, television, newspapers and health workers have significant impacts on improving levels of knowledge about malaria. Of these, television and health workers have the greatest impact: the levels of knowledge about malaria among those who learned about malaria

⁵³ The respondents’ “level of knowledge of malaria” was determined based on the number of correct answers to five questions: how is malaria transmitted? Can malaria be fatal if not treated? Who is at risk of malaria? What are the common symptoms of malaria? Can malaria be prevented? Respondents who correctly answered four or five of these questions (68.6% of a total of 2005 respondents who had heard of malaria) are considered to have high levels of knowledge about malaria.

from these two sources are more than twice as high than among people who did not learn about malaria from these sources.

The lack of significant positive impacts by schools and pharmacies merits further investigation. Schools have a potentially important role in raising awareness among both children and their parents by integrating malaria education into school curricula and parental meetings, and through the involvement of teachers in other malaria-related activities in the commune. Similarly, pharmacies are frequently relied on for health-care services and could be a good entry point for malaria control communication activities.

Table 7: Multivariate analysis – logistic regression: Knowledge about malaria

	Model 1	Model 2
Sex		
Male	1.036	1.002
Female	1	1
Age		
15–29	1.183	1.38
30–39	1.144	1.154
40+	1	1
Education level		
Illiterate	0.241***	0.355***
Primary	0.379***	0.442***
Lower secondary	0.76	0.764
Upper secondary+	1	1
Marital status		
Single	0.664*	0.640*
Ever married	1	1
Ethnicity		
Kinh	0.892	0.861
Ethnic minority	1	1
Monthly income		
Under VND 3,000,000	0.742	0.646
3,000,000 to 4,999,999	1.065	0.987
5,000,000 or more	1	1
Have child(ren) under 5		
No	0.929	1.033
Yes	1	1
Migration status		
Mobile migrant	0.691	0.944
Short-term migrant	0.270***	0.316**
Long-term migrant	0.681*	0.694
Local resident	1	1
Number of sources of information		
Less than 3 sources	0.208***	–
3 sources or more	1	–

	Model 1	Model 2
Information source		
Family member		
Yes	–	1.638**
No	–	1
Neighbour		
Yes	–	1.794***
No	–	1
Radio		
Yes	–	1.635***
No	–	1
TV		
Yes	–	2.146***
No	–	1
Newspaper		
Yes	–	1.542*
No	–	1
Billboard brochure leaflets		
Yes	–	0.834
No	–	1
School		
Yes	–	1.659
No	–	1
Health worker		
Yes	–	2.216***
No	–	1
Pharmacy		
Yes	–	3.952
No	–	1

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

Note: This table presents odds ratios for both model 1 and model 2. In this case, the odds ratio for each variable was calculated by dividing the likelihood of having a high level of knowledge about malaria by the likelihood of having a poor level of knowledge, compared to the reference category (where the odds ratio=1). In model 2, the reference category for the specific categories of information source is the answer “no”.

Where the odds ratio for a category is less than one, it means that the level of knowledge of respondents whose answer was in this category is lower than that of respondents whose answer was in the reference category. Where the odds ratios for a category is greater than one, the level of knowledge of respondents is higher than that of those in the reference category.

For example, the odds ratio for the “Illiterate” category under the “Education” variable in model 1 is 0.241 with three asterisks (i.e. there is a 99.9% chance that the result is not random; see explanation above). This means that, compared to those with upper-secondary education or higher education (the reference category), the level of knowledge about malaria among illiterate respondents was only 0.241 times that of respondents in the reference category (other variables in the model being equal), and this difference is statistically significant. This can also be expressed as a percentage: the level of knowledge among illiterate respondents was only about 24 per cent that among people with upper-secondary education or higher.

Meanwhile, the overwhelming majority in all groups, men and women alike, said that using mosquito nets is effective for malaria prevention (see table 8). Women mobile migrants were most likely to cite insecticides as a prevention tool, however a considerable minority of other groups (men and women) also knew that this was an effective method. Long-term men migrants were most likely to cite long-sleeved clothes and locally resident women the use of burning leaves to create smoke as a repellent. A considerably larger

proportion of short-term women migrants than other respondents knew to clear the corners of the house, as well as bushes around the house, to avoid encouraging mosquitoes. Using insecticides and clearing bushes were respectively the second and third most often-cited prevention methods after mosquito nets.

Table 8: Knowledge of possible malaria-prevention methods by migration status and by sex among respondents who knew that malaria can be prevented (N=1597) (%) (multiple-choice question)

	Mobile migrants		Short-term migrants		Long-term migrants		Local residents	
	Men (N=263)	Women (N=98)	Men (N=30)	Women (N=9)	Men (N=687)	Women (N=365)	Men (N=82)	Women (N=63)
Mosquito nets	97	99	100	100	97.2	97.8	90.2	95.2
Long-sleeved clothes	8.4	9.2	10	11.1	17.8	10.4	8.5	11.1
Burn leaves to create smoke	8.4	4.1	10	11.1	13.8	10.1	15.9	19
Insecticides	28.5	44.9	20	11.1	21.8	20	20.7	9.5
Clear bushes around house	16.7	13.3	23.3	55.6	35.2	24.9	23.2	12.7
Clear the corners of the house to avoid encouraging mosquitoes	8.4	4.1	13.3	33.3	15	11.5	12.2	9.5

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

Note: Respondents were given a range of (correct) options, of which they could choose more than one, including “I don’t know” – only nine respondents chose this last option.

There was not much difference between Kinh and ethnic minority respondents in terms of knowledge of prevention methods. While over 90 per cent of both Kinh and ethnic minority respondents cited the use of mosquito nets, knowledge of other methods was much lower, with less than a third of both Kinh and ethnic minority citing methods other than mosquito nets. Levels of knowledge of other prevention methods are lower among ethnic minority women than among ethnic minority men. For example, only 12.7 per cent of the women knew to clear bushes around house compared to 24.5 per cent of the men.

Misperceptions of malaria: input from the in-depth study

While a majority of all the respondents in the KAP survey knew that mosquito bites cause malaria, significant confusion about how people actually get malaria was not uncommon among the in-depth study respondents. This confusion existed even where the individual knew that mosquito nets and insecticides are effective methods to prevent malaria.

For example, malaria was associated with having a body weakened by excessive work:

[You get malaria] because of working too much, this doesn't need to be going to forest. When you work too much, then you feel tired, you work too much then at night you wash yourself then you feel the cold, then the next morning you continue to go to work then it is it. For example, my brother-in-law [...], he doesn't need to do anything (to get malaria) [...], in the morning he goes for work, get home in the evening like that, then when he got fever and people still told him he got malaria.

A locally resident man, aged 24, member of the Stieng ethnic minority, who had had malaria many times, most recently three months prior to the interview. Individual interview.

It was attributed to what you eat:

I don't think you get malaria from mosquito bites, but I don't know how you do get it ... I used to live and eat in the forest, drink non-boiled water and have a lot of mosquito bites, but I didn't catch anything. Now, maybe, because we buy food at the market – food at the market nowadays has a lot of fertilizers and pesticides on it ... Now we drink boiled water, we eat well-cooked food, but we get malaria. I don't know who's at high-risk, whoever gets it gets it, it's like playing the lottery.

A locally resident man, aged 54, member of the Stieng ethnic minority, who had had malaria more than one year prior to the interview. Individual interview.

There was considerable confusion about what malaria actually is, and how you catch it – in part because, in Vietnamese, the word for “malaria” is literally “fever and cold”. Indeed, many respondents used the word for “fever” instead of that for “malaria”.

You get cold symptoms, then it turns into malaria... We may think that mosquito bites transmit “fever” but in fact “fever” isn't transmitted by mosquitoes, but colds are. Saying that malaria is contagious isn't true, if you sleep close to someone who has a cold, then you can catch it, but not malaria.

A long-term migrant man, aged 42, of Kinh ethnicity, who had malaria at around the age of 15. Individual interview.

Even the local authorities were confused:

Here everybody had malaria, [but] recently local people are more likely to get it... The ethnic minority people call it “dengue” ... I've had malaria two or three times since the beginning of the year, I'm not sure whether it was already in my body or somewhere in the air, it's called “super virus flu” ... malaria and super virus flu are the same.

Male village leader. Focus-group discussion among village leaders.

2.1.5. Malaria-prevention practices



Many people use clothing to protect themselves from mosquito bites when they go to work in forested areas in Dak O Commune (Photo credit: Vu Manh Loi).

Table 9 shows the methods actually used by respondents who had heard of malaria to prevent malaria (as opposed to the methods respondents knew about, see table 8 above), of which mosquito nets are by far the most popular,⁵⁴ followed by mosquito coils. Mobile migrants (particularly women) are more likely than others to use mosquito coils. Other prevention methods are used by a very small proportion of respondents: women short-term migrants for example, only use mosquito nets and mosquito coils.⁵⁵ Women in all groups are far less likely than men to use sleeping bags. The qualitative data from the in-depth study show that few people use insect repellent because it is expensive, particularly because in this area it would have to be used continuously and for a long time.

Not many people buy and use insect repellent. It is expensive. And after a few years the mosquitoes will be resistant to it.

Commune leader. Focus-group discussion with commune leaders, in-depth study.

According to the in-depth study, mosquito coils are more popular because they are more affordable and convenient, particularly among people who work in rubber plantations.

People who work in rubber plantations work at night, starting at 1 or 2 am, so they have to use something to prevent mosquito bites. They buy mosquito coils (one package costs VND 10,000) and put them in their caps [to deter mosquitoes from the head down]. Only those who work to extract rubber latex can use it because their work is relatively stationary. People working with cassava can't use them [because they move around too much].

Commune leader. Focus-group discussion with commune leaders, in-depth study.

54 These are responses to question 22 of the KAP questionnaire, which follows from questions 16–21 – see above. The questionnaire did not in this case distinguish between ITNs and non-treated nets. Respondents were given a range of (correct) options, of which they could choose more than one, including “Do nothing” and “Other (specify)”.

55 Of the 16 women short-term migrants who had heard of malaria, 15 women reported using mosquito coils or mosquito nets; one woman answered “I don't know”.

Table 9: Malaria-prevention methods used by respondents, by migration status and by sex (%) (multiple-choice question)

	Mobile migrants		Short-term migrants		Long-term migrants		Local residents	
	Men (N=331)	Women (N=149)	Men (N=47)	Women (N=16)	Men (N=807)	Women (N=443)	Men (N=114)	Women (N=98)
Mosquito nets	97.6	98.7	100	93.8	99.5	98.9	97.4	96.9
Mosquito coil	22.4	28.2	14.9	6.3	19.8	16	14.9	17.3
Sleeping bags	6.3	2.7	6.4	0	4.2	0.9	5.3	1
Fire and smoke	6.3	4	10.6	0	10.2	7.9	14	14.3
Mosquito repellent	5.4	2	2.1	0	8.1	5	3.5	1
Close windows and doors	0.6	0	4.3	0	2.7	1.4	3.5	1
Use window nets	0.3	0	2.1	0	0.9	0.7	0	1
Do nothing	3.9	8.7	10.6	0	3.7	3.4	5.3	9.2

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

Note: A number of respondents chose “other”: 25 mobile migrants, 6 short-term migrants, 74 long-term migrants and 20 local residents. These local residents said they “didn’t know”. The other respondents had varied responses, saying that they “didn’t know” or cited: food hygiene (only long-term migrants mentioned this; it is incorrect); killing mosquitoes with an electric racket; killing mosquito larvae; removing stagnant water sources; using an electric fan to keep mosquitoes away; using a blanket as a cover (this is not an effective method); using a hammock with a net; and avoiding sleeping in “ray”.

The data were also analyzed by the education level and ethnicity of respondents. Again, mosquito nets were by far the most popular method, followed by mosquito coils, and other methods were barely used. Respondents with higher levels of education were more likely than those with lower levels to use either of these methods. The same pattern of popularity applies to both men and women of both Kinh ethnicity and among ethnic minorities, although levels of use of both methods were higher among Kinh respondents, and higher among more educated Kinh and ethnic minorities than among less educated respondents from both groups.

In addition, a large majority of the in-depth study respondents reported using at least one method to prevent mosquito bites when they went to stay overnight in the forest (see table 10 below). However, it was also not uncommon to hear respondents noting during the in-depth interviews that they do not use any of these methods:

I get most mosquito bites during cassava season, when I go to work in the forest and sleep in the “ray”, going home only once a week. From my home to my workplace is a long way. I don’t take repelling incense sticks, insect repellent spray or a mosquito net. I only use a hammock and blanket. I don’t like to use cream because I can’t get used to it and anyway I can’t afford it. At home I use a mosquito net, which is set up all day long.

22-year-old man, Stieng ethnic minority. Interview, in-depth study.

Table 10: In-depth study: Proportion of respondents who use malaria-prevention methods when they sleep in the forest (N=131) (%) (multiple-choice question)

	Mobile migrants (N=14)	Short-term migrants (N=17)	Long-term migrants (N=13)	Local residents (N=87)
Untreated mosquito net	21.4	52.9	38.5	29.9
ITN	50.0	52.9	61.5	39.1
Insect repellent cream	0	5.9	7.7	3.4
Other (including, as specified by respondents): canvas, hammock with/without net, repelling incense sticks	35.7	17.6	15.4	14.9

Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: For this question (3.2 of the in-depth study), for each method respondents were asked first whether they used it and, if they answered yes, how often (always/sometimes). One mobile migrant, one short-term migrant and 17 local residents said that they did not use any prevention methods.

Even where they are used in forested areas, mosquito nets cannot prevent all mosquito bites, since some of the jobs undertaken require people to wake up and go to work very early in the morning, when *Anopheles* mosquitoes are most active. In addition, workers may not be able to use other prevention methods because they are impractical or inefficient. Cassava workers, for example, are at very high risk of contracting malaria:

When I work during cassava season, I get a lot of mosquito bites. There are a lot of mosquitoes at the times when we work and sleep. At the worksite, people burn fires to create smoke, but it doesn't help much. Digging cassava usually starts at around 4am when there are a lot of mosquitoes, and many men keep their upper body naked while they work in order to feel cool, because the weather is very hot. I don't think mosquito bites kill, so I let it go.

22-year-old man, Stieng ethnic minority. Interview, in-depth study.

Similarly, bathing in streams after dark precludes the use of traditional prevention methods and therefore increases malaria risk. The in-depth study revealed that most likely to do this are people living in areas where well water is not available; women who do not want to bathe outside during the day (related to modesty); and men who need to bathe after finishing work late.

Mosquito nets

As table 11 below shows, ownership of mosquito nets is universal among all migrant/resident categories. Many respondents, men and women, use non-insecticide-treated nets, although mobile and short-term migrants use them more than long-term migrants or local residents. Long-term migrants were most likely to use ITNs – whether provided by the commune or treated by a health worker – and mobile migrants were least likely to use them. Women in all groups were more likely to use ITNs than men. Hammocks with nets⁵⁶ are used by a small proportion of people in all groups, with the exception of short-term migrant men. These are reportedly convenient and effective, although relatively expensive (about VND 300,000 per set).

Table 11: Ownership and use of mosquito nets by migration status and sex (%)

	Mobile migrants		Short-term migrants		Long-term migrants		Local residents	
	Men (N=331)	Women (N=149)	Men (N=47)	Women (N=16)	Men (N=807)	Women (N=443)	Men (N=114)	Women (N=98)
Family has [at least] one mosquito net ⁵⁷	98.5	98.7	100	100	99.8	99.5	98.2	96.9
Those respondents who owned one or more mosquito nets were asked to choose from the following options (multiple-choice question):								
Use non-insecticide-treated net(s)	77.9	71.8	66	50	46.2	41.3	43	28.6
Use net(s) treated with insecticide by a health worker	16.9	24.8	23.4	25	48.7	50.8	33.3	38.8
Use ITN(s) provided by the commune	13.3	15.4	19.1	43.8	30.9	35.2	42.1	66.3
Use hammock(s) with net(s)	12.1	0.7	0	6.3	8.4	4.1	6.1	1

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

The overwhelming majority of respondents said that all family members used nets, although fewer women than men in every group said this was the case. Drinking habit (and the consequence of drunkenness) among men was often mentioned in in-depth interviews as a possible factor that increased their risk of being exposed to mosquito bites:

There are a lot of mosquitoes here. Without a mosquito net, you can't sleep. Sometimes I don't use it because I'm drunk and I forget to put it up. Other than that I use it every day.

20-year-old man, Kinh ethnicity. Interview, in-depth study.

⁵⁶ These nets are not distributed by the NCMP, but may have been treated with insecticide after purchase.

⁵⁷ This relates to question 23, which includes two parts: does your family have a mosquito net? If yes, how many? These data relate to the first part of the question.

Of those respondents who reported going to stay in forested areas regularly, mobile and short-term migrant respondents seem to use mosquito nets most often: 91.8 per cent (N=243) and 75 per cent (N=40) respectively said they take a mosquito net with them to the forest, while only 61 per cent of long-term migrants (N=724) and 58.6 per cent of the local residents (N=99) did so. A significant gender difference can be observed among long-term migrants, with 66.1 per cent of men taking a mosquito net with them compared to only 50 per cent of women, but there is no significant difference in the other groups. People with higher education levels in all groups tend to be more likely to bring mosquito nets when they go to stay in forested areas. This is particularly true of long-term migrants, among whom 53.3 per cent of the respondents with primary or lower education (N=351) reported doing so compared to 68.4 per cent of the respondents with secondary or higher education (N=373). A connection can be drawn between the lower percentage of long-term migrants and local residents who take mosquito nets when they stay overnight in forested area, and their considerably lower level of education compared to mobile and short-term migrants. As seen above, the data from the in-depth study showed that the mosquito nets used during overnight stays in forested areas are not always ITNs.

2.1.6. Health-care seeking behaviour and treatment

It should be noted that the data and this analysis do not necessarily reflect current practice or behaviours, as there is no timeframe indicated for experience of malaria – as these respondents include all those who had ever had malaria, cases may be current, recent or have occurred in the more distant past.

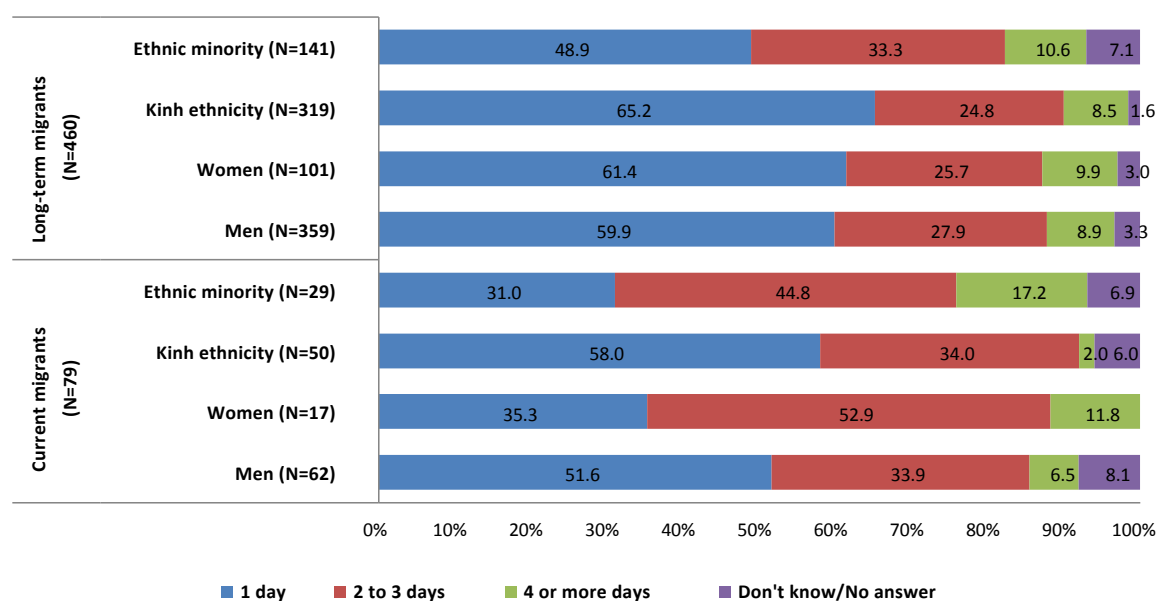
A total of 66 (13.8%) mobile migrants, 13 (20.6%) short-term migrants, 408 (32.6%) long-term migrants and 62 (29.2%) local residents said that they had ever had malaria. However, since the question was not time-delimited, it is possible that recall bias may be confounding the results. Another potential confounding factor is the common confusion between malaria and fever (see section 2.1.4). Further study is necessary to accurately estimate the malaria prevalence among migrant and local groups.

Due to these small numbers, for the purpose of analysis *in this section only*, two groups will be used instead of four: the data for mobile and short-term groups will be combined into a “current migrants” group, and the data for long-term migrants and local residents will be combined into a “long-term residents” group. In this analysis, short-term migrants account for only 16.5 per cent of the “current migrants” group who had ever had malaria (N=79), and local residents account for only 13.2 per cent of the “long-term residents” group who had ever had malaria (N=470). This means that the “current migrants” group data essentially reflect the situation of mobile migrants, and the “long-term residents” group data essentially reflect the situation of long-term migrants.

Most respondents who have contracted malaria have sought out health-care and/or treatment. All 79 people in the “current migrant” group who had ever had malaria had sought treatment. Of the 470 people in the “long-term resident” group who had ever had malaria, only ten people (four men, six women, three Kinh respondents and seven ethnic minority respondents) did not seek treatment.

Generally speaking, respondents in the “current migrants” group wait longer before seeking treatment for malaria than those in the “long-term residents” group (see figure 8). In addition, more men and Kinh respondents in the “current migrants” group seek treatment within a day than women and ethnic minority people in this group. More Kinh respondents than ethnic minority respondents in the “long-term residents” group also seek treatment within a day, but there is no significant difference between men and women in this group.

Figure 8: How long after contracting malaria did you seek treatment? – by gender and ethnicity (N=539)



Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

The overwhelming majority of respondents who had ever had malaria, among both “current migrants” (82%, N=79) and “long-term residents” (91.7%, N=460), sought advice/treatment at commune health centres or public health clinics. A significant minority also visited local health workers (which comprises both professional health officers working in commune health centres and community-based village health workers). A very small number of respondents used pharmacies and private facilities, and no respondents visited a traditional healer. There are minimal differences between men and women. The differences between Kinh and ethnic minority respondents are slightly greater (see table 12).

Table 12: Place of treatment by ethnicity (N=539) (%)

	Current migrants		Long-term residents	
	Kinh (N=50)	Ethnic minority (N=29)	Kinh (N=319)	Ethnic minority (N=141)
Commune health center or clinic	88	72.4	93.1	88.7
Local health worker	8	10.3	26.6	14.2
Traditional healer	0	0	0	0
Pharmacy	2	3.4	4.4	4.3
Private facility	8	13.8	4.1	3.5

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

Very few malaria patients in either group reported having to pay for these services: 10.4 per cent of the current migrants and 5.4 per cent of the long-term residents.⁵⁸

Most malaria patients completed the full course of prescribed medicines (see figure 9); the others only took the medicine until their fever ended. Women in the “current migrants” group have the lowest proportion of completing the full course, and fewer ethnic minority respondents than Kinh respondents complete the full course. Further analysis shows that only 75.8 per cent of “current migrants” with primary education or lower complete the full course, while 95.3 per cent of those with secondary education or higher do so.⁵⁹ Of these respondents, only 66.7 per cent of those belonging to an ethnic minority and with primary education or lower complete the course, compared to 83.3 per cent of those with Kinh ethnicity and the same level of education.⁶⁰ It seems that having a lower education, being a woman and belonging to an ethnic minority

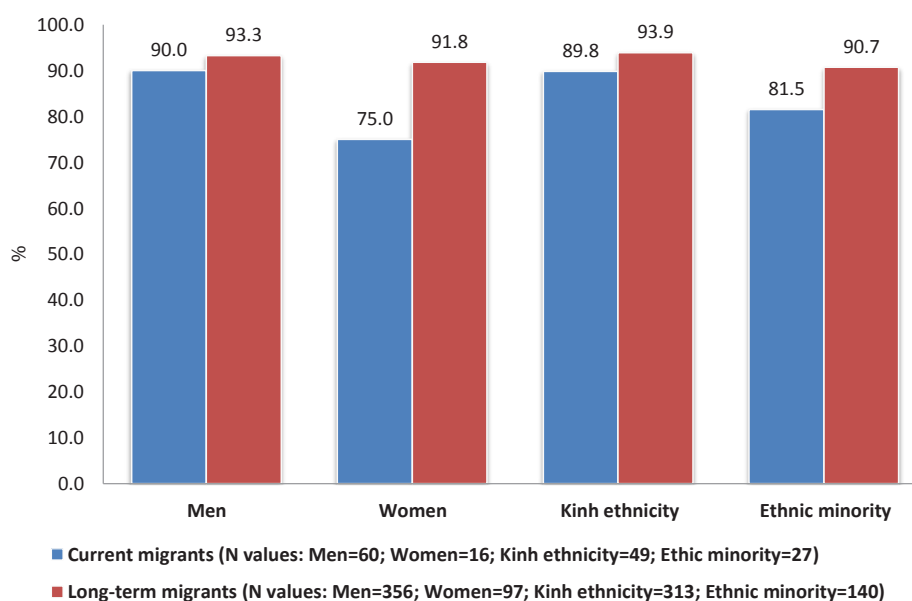
58 N=67 and N=428 respectively.

59 N=33 and N=43 respectively.

60 N=18 and N=15 respectively.

impact negatively – and independently – on the likelihood of completing a full course of treatment. These patterns are less straightforward among the “long-term residents”. In addition, due to the small number of cases of malaria studied, further research will be necessary to confirm these findings.

Figure 9: Proportion of malaria patients who completed the full course of malaria medication by sex and by ethnicity (N=529)



Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

At the time of the survey, 8.2 per cent of the respondents reported having malaria and/or fever medicines at home.⁶¹ However, only four people actually did have medicines specifically for malaria. Other respondents listed conventional fever medicines such as Decolgen (paracetamol with decongestants) or Panadol (paracetamol), or even vitamin C. Although selling malaria drugs without prescription is prohibited in Viet Nam, 7.5 per cent of the respondents believe they can easily buy them.

2.1.7. Other vulnerability factors

2.1.7.1. Proximity to forest environments, border areas and streams

Forests and water sources provide ideal environments for mosquitoes to live and breed, meaning that the closer people live to such a source, the more they are at risk of malaria. In Binh Phuoc, as elsewhere in the Greater Mekong Subregion, border areas also represent a higher-risk environment.⁶²

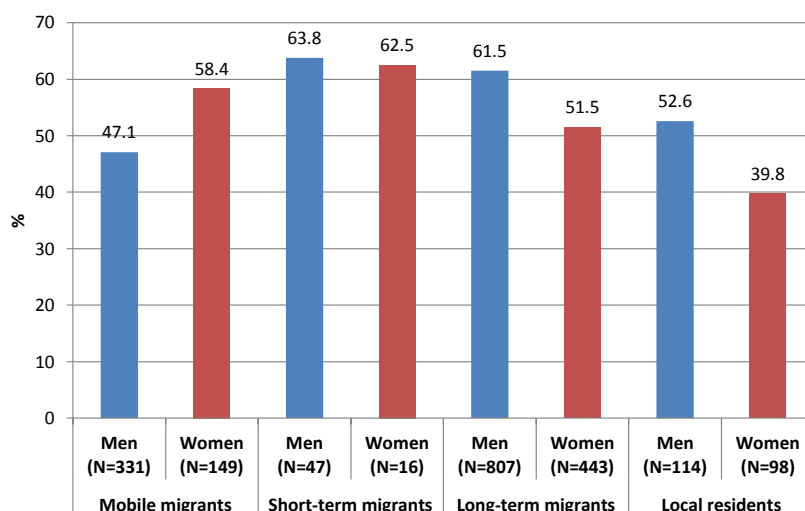
Both men and women in all of the groups reported often going to forested or border areas, with the percentage of respondents doing so ranging from 39.8 per cent to 63.8 per cent (see figure 10). The data also show that respondents often spend several nights in the forest, with long-term migrants averaging 6.9 day stays, local residents 9.3 days, short-term migrants 13.7 days and mobile migrants 24.6 days.⁶³

⁶¹ N=2005.

⁶² See, for example, Bhumiratana, A. et al. *Border Malaria Associated with Multidrug Resistance on Thailand-Myanmar and Thailand-Cambodia Borders: Transmission Dynamic, Vulnerability, and Surveillance*. BioMed Research International. Volume 2013 (2013): “Border malaria encompasses any complex epidemiological settings of forest-related and forest fringe-related malaria, both regularly occurring in certain transmission areas and manifesting a trend of increased incidence in transmission prone areas along these borders, as the result of interconnections of human settlements and movement activities, cross-border population migrations, ecological changes, vector population dynamics, and multidrug resistance.”

⁶³ These data are from respondents who reported *often* going to forested and border areas.

Figure 10: Proportion of respondents who often go to forested or border areas, by sex and migration status



Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

Multivariate regression analysis of these data shows that going to forested or border areas is strongly linked with age, marital status, income and having children under five: younger people, people who have ever been married, people with middle-income levels, and those with children under five are most likely to do so. It should be noted that people in the lowest income bracket are almost half as likely to go to forested or border areas as those with the highest level of income. The data show no links to sex, education, ethnicity, or even migration status.

Table 13: Multivariate analysis – logistic regression: Respondents who often go to forested or border areas

Sex	
Male	1.161
Female	1
Age	
15–29	1.675***
30–39	1.473**
40+	1
Education	
Illiterate	1.325
Primary	1.229
Lower secondary	1.251
Upper secondary+	1
Marital status	
Single	0.716*
Ever married	1
Ethnicity	
Kinh	1.130
DTTS	1
Income	
Under VND 3,000,000	0.565**
3,000,000 to 4,999,999	1.637**
5,000,000 or more	1
Having children under 5	
No	0.679***
Yes	1
Migration status	
Mobile	0.996
Short-term migrants	1.720
Long-term migrants	1.362
Local people	1

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

As table 14 shows, mobile, short-term and long-term migrants tend to live closer to the forest than local residents: 40.8 per cent, 44.4 per cent and 46.2 per cent respectively live less than five kilometres from the nearest forest, while only 34.9 per cent of the local residents do so.⁶⁴ Meanwhile, long-term migrants and local residents live closer to water, with 82.5 per cent and 70.8 per cent respectively living less than five kilometres from the nearest stream. Less than 65 per cent of mobile and short-term migrants live this close to streams.

However, this does not reflect the whole picture. Further analysis from the in-depth study (see section 2.2.2) shows that people living in this area – both migrants and mobile people, and local residents – often have more than one residence. This means that, even where respondents to the KAP survey reported living further away from a forest or stream, they might be spending some – or even most – of their time in a secondary residence which is closer to either or both of these.

⁶⁴ The distance ranges provided in the questionnaire were “less than five km”, “five to ten km” and “more than ten km”. However, scientific evidence for the validity of these ranges was lacking. In future malaria studies, it will be important to document the relevance of the distance ranges, especially in relation to the flight range of mosquitoes.

Table 14: Distance from home to the nearest forest or stream (%)

	Mobile migrants (N=480)	Short-term migrants (N=63)	Long-term migrants (N=1250)	Local residents (N=212)
Nearest forest				
Less than 5 km	40.8	44.4	46.2	34.9
5 to 10 km	19.6	20.6	21.0	32.5
More than 10 km	39.6	34.9	32.7	32.5
Nearest stream				
Less than 5 km	64.8	63.5	82.5	70.8
5 to 10 km	16.5	17.5	8.2	22.2
More than 10 km	18.8	19.0	9.3	7.1

Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

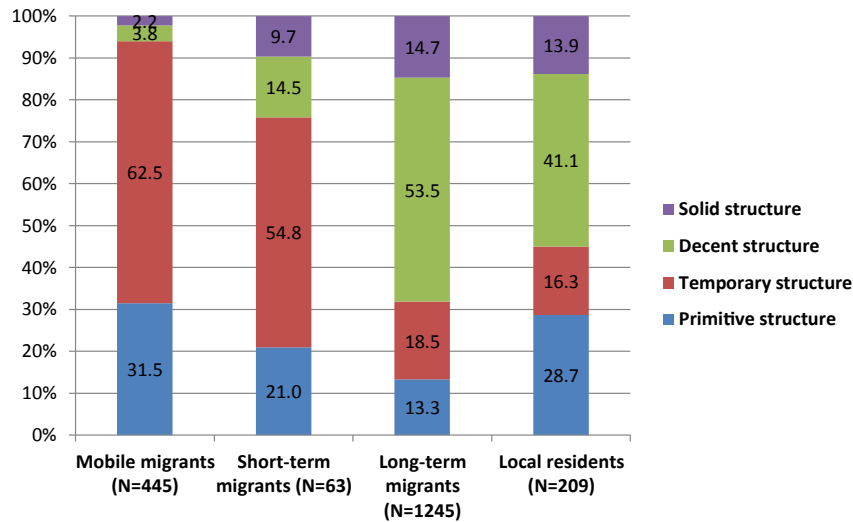
2.1.7.2. Housing type

Housing affects mosquito risk: the ability to keep mosquitoes out and the effectiveness of other malaria-prevention measures depend on the structures people live in. Figure 11 shows that the majority of both mobile and short-term migrants live in “temporary” structures (which have walls made from bamboo or plastic sheeting, but often have an iron sheet for a roof). A substantial proportion of mobile migrants and local residents live in “primitive” structures – which are also built from bamboo, but only have plastic sheeting for a roof. Meanwhile, nearly 70 per cent of long-term migrants and 55 per cent of local residents live in either “decent” structures (which are bigger, have walls, doors and a waterproof roof, and are structurally sound and windproof; they may even have concrete elements) or “solid” structures. These have walls, doors, a roof and floor built from concrete and other modern materials. However, only 24.2 per cent of short-term migrants and 6 per cent of mobile migrants do so.



From left to right: Primitive, temporary, decent and solid housing structures (Photo credit: IMPE survey team and Mai Trieu).

Figure 11: Structure of residence (N=1962)



Source: IOM calculations, based on the IMPE HCMC KAP survey 2014–2015.

2.2. Findings from in-depth study in Dak O Commune

2.2.1. General socioeconomic characteristics and geographical distribution of respondents

Generally speaking, the characteristics of the in-depth study respondents and the differences between the groups, are very similar to those of the KAP survey respondents. There were more men (66.7%) than women in the in-depth sample — as there were in the KAP sample (64.8% men) — as well as a good representation of different ages (although there were slightly more older respondents in the KAP survey than in the in-depth survey). Overall the education level of in-depth respondents was a little lower.

There were two major differences in the samples. Namely that Kinh respondents were a minority in the in-depth study (29.7%), but constituted the majority of respondents in the KAP sample (58.1%). Additionally there was a higher malaria incidence among the in-depth study respondents (27.4% average lifetime incidence among KAP respondents, compared to 36.7% of in-depth study respondents in the previous five years alone), which can be attributed to the inclusion in the in-depth study of sub-sample of local residents⁶⁵ and malaria patients.

65 The higher proportion of ethnic minority respondents is due to the fact that more local residents were ethnic minority people – particularly members of the Stieng minority, which is a significant minority in Binh Phuoc province in general. It is furthermore the most prevalent ethnic minority living at the survey sites in Dak O Commune.

Table 15: General characteristics of respondents in in-depth study (full sample) (%)

	Mobile migrants (N=51)	Short-term migrants (N=25)	Long-term migrants (N=33)	Local residents (N=191)	Total (N=300)
Sex					
Female	35.3	40.0	36.4	31.4	33.3
Male	64.7	60.0	63.6	68.6	66.7
Age					
15–29	33.3	56.0	21.2	38.7	37.3
30–39	17.6	36.0	36.4	34.0	31.7
40+	49.0	8.0	42.4	27.2	31.0
Marital status					
Single	21.6	4.0	24.2	9.4	12.7
Married	78.4	96.0	75.8	90.6	87.3
Ethnicity					
Kinh	17.6	32.0	66.7	26.2	29.7
Ethnic minority	82.4	68.0	33.3	73.8	70.3
Education					
Primary or less	74.5	64.0	33.3	60.0	59.9
Lower secondary	19.6	20.0	30.3	32.6	29.1
Upper secondary+	5.9	16.0	36.4	7.4	11.0
Respondent's monthly individual income					
Under VND 3,000,000	37.3	8.0	18.2	37.7	33.1
3,000,000 to 4,999,999	56.9	88.0	48.5	46.1	51.8
5,000,000 or more	5.9	4.0	33.3	15.7	15.1
Have children under five currently living in the same household					
Yes	29.4	40.0	27.3	46.1	40.9
Had malaria within the last 5 years (2010–2015⁶⁶)					
Yes	17.6	32.0	39.4	41.9	36.7

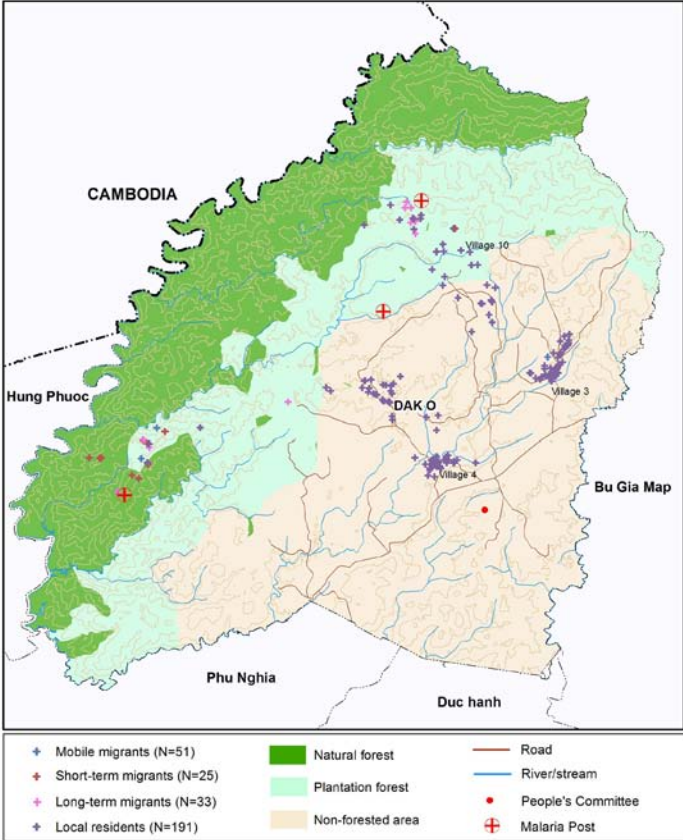
Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: With regard to the last characteristic “Had malaria within the last 5 years (2010–2015)”, the data include the sub-sample of 50 malaria patients obtained from the CHC list, and therefore risks make the sample biased towards malaria incidence among the long-term migrants and local residents.

66 Up to August 2015, when the in-depth survey was conducted.

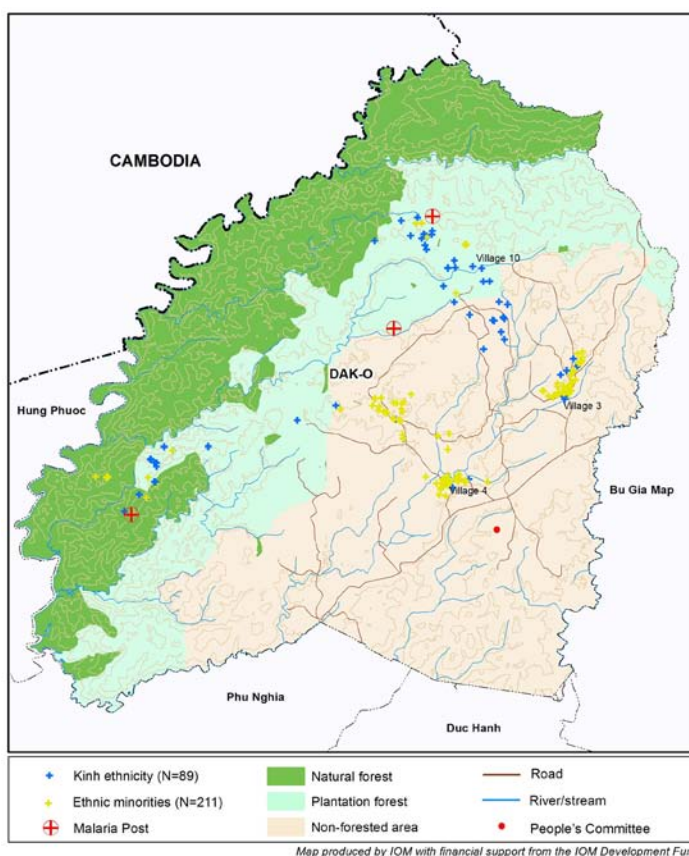
The maps below show the geographical distribution of the in-depth study respondents by migration status and ethnicity. Migrants (mobile, short-term and long-term) and Kinh people tend to live closer to the forest than local residents and ethnic minority people.

Map 7: Geographical distribution of in-depth study respondents by migration status



Source: Map produced by IOM based on the IMPE HCMC in-depth survey 2015.

Map 8: Geographical distribution of in-depth study respondents by ethnicity



Source: Map produced by IOM based on the IMPE HCMC in-depth survey 2015.

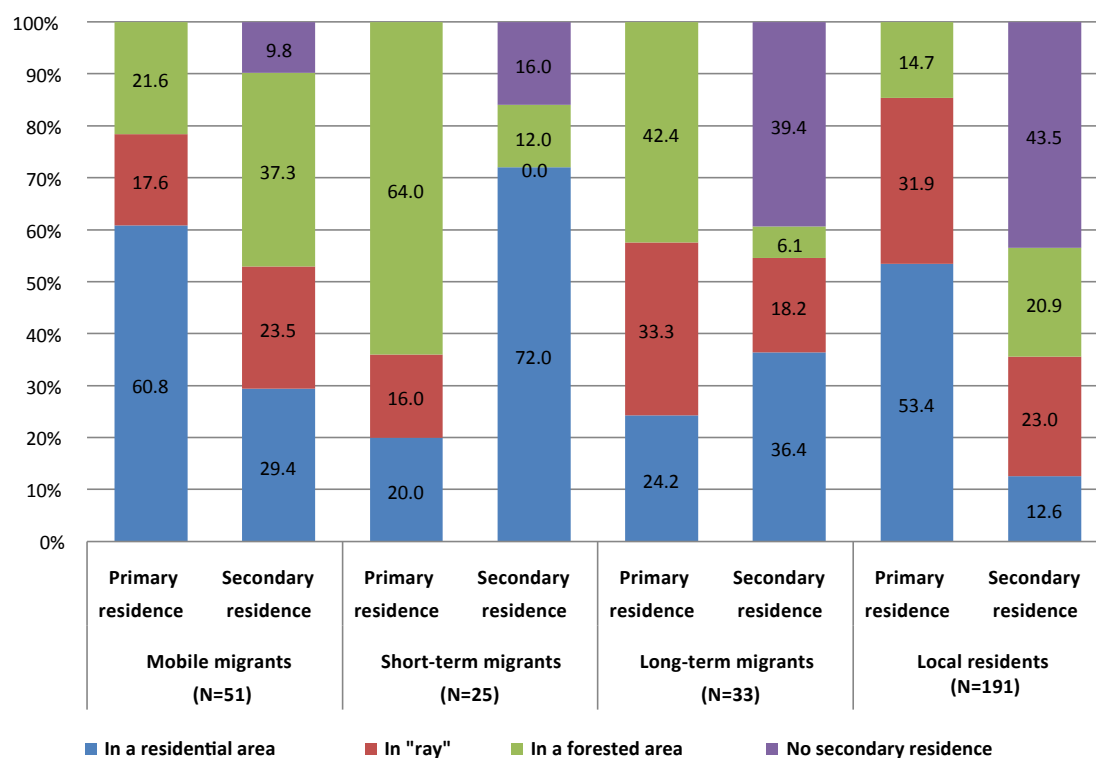
2.2.2. Mobility within and beyond Dak O

The in-depth study results showed that a majority of respondents (80% of the total sample) have more than one residence⁶⁷ within Dak O Commune. This is particularly true of mobile migrants (90.2% of whom have more than one residence) and short-term migrants (84%). As this means that most respondents live in two or more places, it indicates that members of all four groups are very mobile. This can be linked to both the type of work undertaken (agricultural) and to the mountainous terrain, which makes transport extremely difficult and expensive. As figure 12 shows, many respondents have their primary or secondary dwellings in “ray” or in forested areas. Indeed, a considerable majority of short-term and long-term migrants have their primary residence in one of these areas, meaning they have the most direct exposure to the forest environment and therefore to malaria risk. The data also show that mobile migrants spend the most time (93 days per year on average) in a secondary residence, only spending 251 days in their primary residence.⁶⁸ Short-term migrants spend the next highest number of days in a secondary residence, followed by local residents. Long-term migrants spend the least time (48 days per year on average) in their secondary residence, compared to 313 days in their primary residence.

67 House or other structure. The primary residence is defined as the place where respondents sleep most of the time.

68 These are mean values.

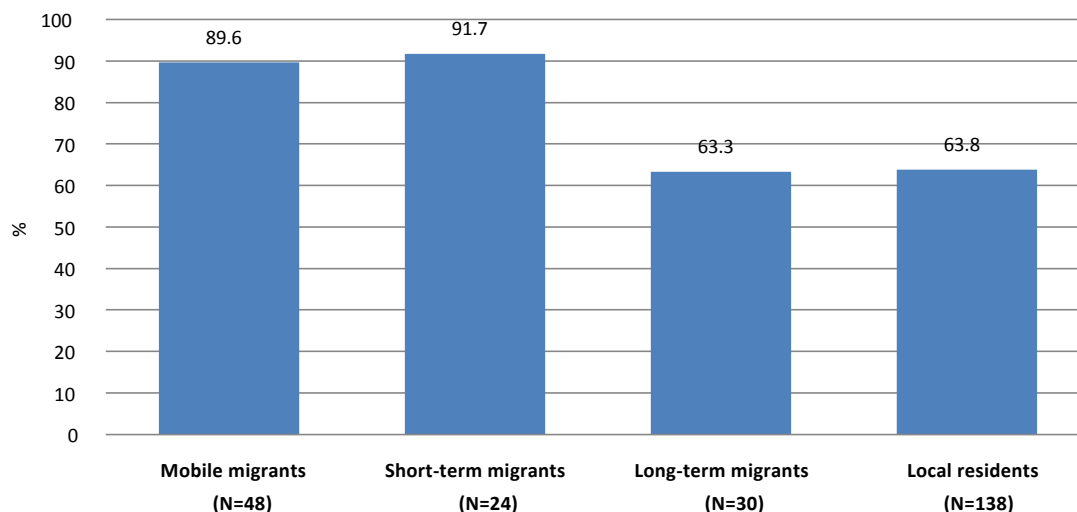
Figure 12: Location of primary and secondary residences



Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Mobility between residences involves both individuals and their families. Of the respondents who have a secondary residence, only 28.3 per cent live there alone: 71.7 per cent live there with at least one family member. This “family mobility” is particularly common among mobile and short-term migrants – see figure 13 below.

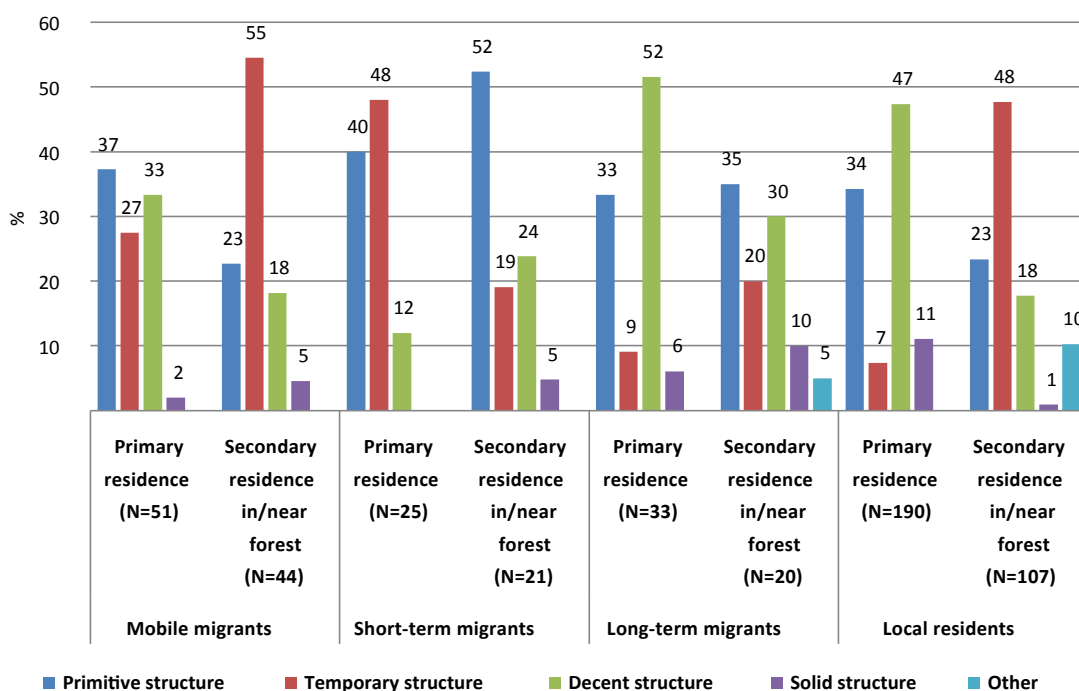
Figure 13: Proportion of respondents who are joined by at least one family member when at their secondary residence (N=240)



Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Meanwhile, as figure 14 shows, long-term migrants and local residents have better-constructed houses than mobile or short-term migrants: 58 per cent of both the former groups have a “decent” or “solid” primary residence, while only 35 per cent and 12 per cent, respectively, of the latter groups do.⁶⁹ This impacts on their ability to protect themselves from mosquitoes and therefore, on malaria risk. In addition, local residents have a much better-constructed primary residence than secondary residence. In contrast, the difference in quality of primary and secondary residences among mobile, short-term and long-term migrants is not so great – this may imply that they spend almost as much time in each.

Figure 14: Primary and secondary housing structure by migration status (N=299)



Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

⁶⁹ See section 2.1.7.2 above for the definitions of these housing structures.

The mobility of the Dak O respondents is not restricted to within the commune (see table 16). Unsurprisingly, this is particularly true of among mobile and short-term migrants, a significant minority of whom – both men and women – said they had worked in other commune(s) in the same district, or in other provinces, in the 12 months prior to the survey. Generally speaking, men were more likely to be mobile than women, with the exception of mobile and short-term migrant women, who were more likely than the men in these groups to work in another province.

Table 16: Location of main workplace in the 12 months prior to the survey by migration status and gender (%)

	Mobile migrants		Short-term migrants		Long-term migrants		Local residents	
	Women (N=18)	Men (N=33)	Women (N=10)	Men (N=15)	Women (N=12)	Men (N=21)	Women (N=60)	Men (N=131)
Work within the commune only	27.8	21.2	10	33.3	66.7	81	90	74.8
Work in another commune within the district	33.3	51.5	20	20	0	0	1.7	3.1
Work in another district within the province	5.6	6.1	0	0	0	4.8	0	0.8
Work in another province	22.2	9.1	20	13.3	0	0	0	0
Work in Cambodia	0	0	0	0	0	0	0	1.5
Work in another country	0	0	0	0	0	0	0	1.5

Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: This data is from question 3.1 on respondents' main job per month over the last 12 months. The options were mutually exclusive. Not all respondents provided enough information to establish their main workplace.

The results are less markedly different between Kinh and ethnic minority respondents (see table 17), although Kinh mobile and short-term migrants were more likely to work within the commune only. However, when they did travel to work, they travelled further (at least within Viet Nam) – more Kinh than ethnic minority respondents in the group of mobile migrants worked in another province, while more ethnic minority than Kinh respondents worked elsewhere in the same district or the same province.

Ethnic minority local residents are, however, slightly more likely to travel abroad: of the eight respondents who had worked in Cambodia during the previous year: four were locally resident ethnic minority men (of whom two had worked in Cambodia for the entire year prior to the survey), three were locally resident Kinh men and one was a long-term Kinh migrant man. The two respondents who had worked in another (unspecified) country were both ethnic minority men. It is extremely likely that this data greatly underrepresents the actual scale of cross-border mobility, as such movements are often irregular and associated with illegal activities (such as logging). It was not easy for the survey team to find and approach people in this group, although a local guide was able to provide limited access to an informal and temporary settlement where people were staying during their journey to a worksite. Other respondents from this group may have been interviewed randomly, as part of the study cohort. However, even where such people could be interviewed, they were not always willing to confirm that they had crossed a border, or to discuss the issue.

Table 17: Location of main workplace in the 12 months prior to the survey by migration status and ethnicity (%)

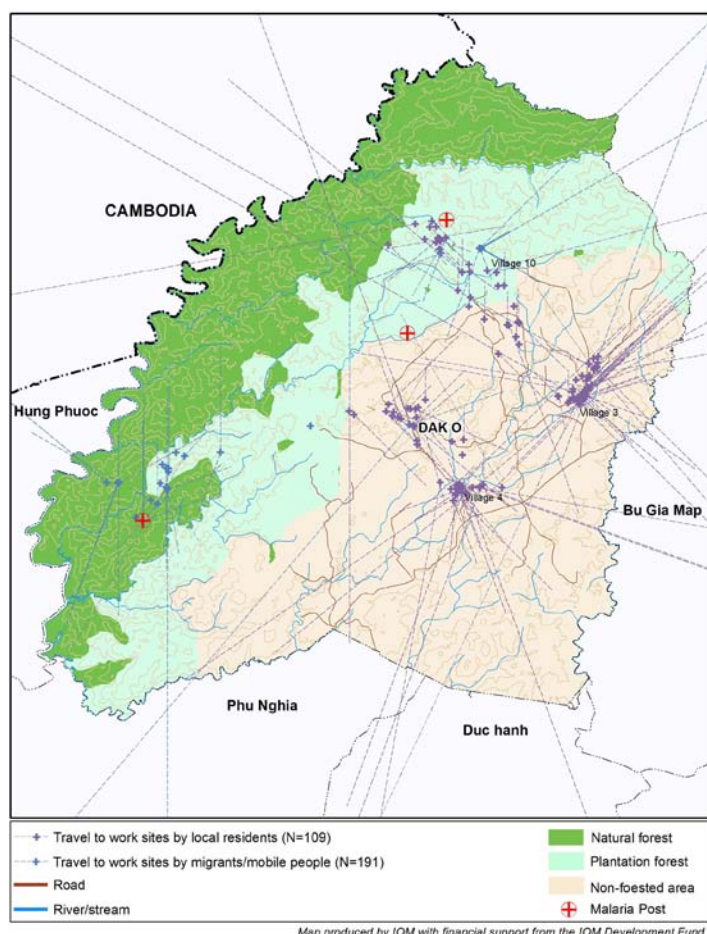
	Mobile migrants		Short-term migrants		Long-term migrants		Local residents	
	Kinh (N=9)	Ethnic minority (N=42)	Kinh (N=8)	Ethnic minority (N=17)	Kinh (N=22)	Ethnic minority (N=11)	Kinh (N=50)	Ethnic minority (N=141)
Work within the commune only	44.4	19	62.5	5.9	72.7	81.8	84	78
Work in another commune within the district	11.1	52.4	12.5	23.5	0	0	2	2.8
Work in another district within the province	0	7.1	0	0	4.5	0	2	0
Work in another province	22.2	11.9	0	23.5	0	0	0	0
Work in Cambodia	0	0	0	0	4.5	0	6	2.8
Work in another country	0	0	0	0	0	0	0	1.4

Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: This data is from question 3.1 on respondents' main job per month over the last 12 months. The options were mutually exclusive. Not all respondents provided enough information to establish their main workplace.

The additional analysis provided by the mapping of respondents' current/previous workplaces and work-related travel – see map 9 – suggests that the mobility of the local respondents is more dynamic than that reflected in the data in table 17 above. However, it is also possible that the local residents are more at ease speaking in geospatial terms (direction and distance, as for the mapping exercise) than in administrative terms (for example according to commune, district and province, as required by the questionnaire), which would bias the results in favour of the mapping exercise.

Map 9: Travel from current/previous work site by migration status

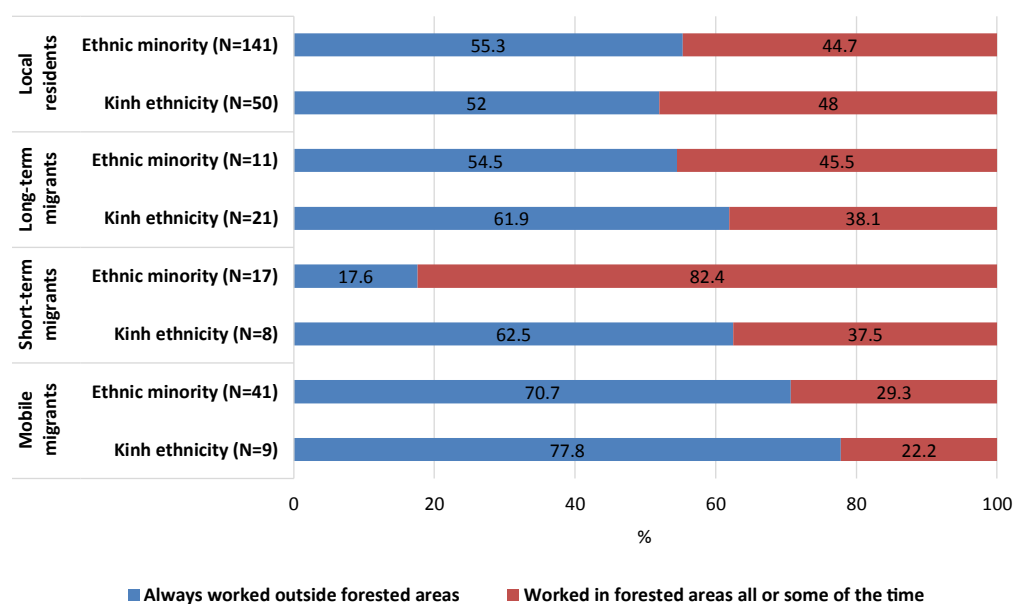


Source: Map produced by IOM based on the IMPE HCMC in-depth survey 2015.

Note: This map shows estimated distance and direction from the interview location to respondents' current/previous place of work within the last 12 months. For most respondents – 98.4 per cent of local residents (N=190); 65.6 per cent of long-term migrants (N=32); 37.5 per cent of short-term migrants (N=24); and 17.6 per cent of mobile migrants (N=51) – the interview location was the respondent's residence. For others, the interview location was their current work site; rarely, it was neither of these.

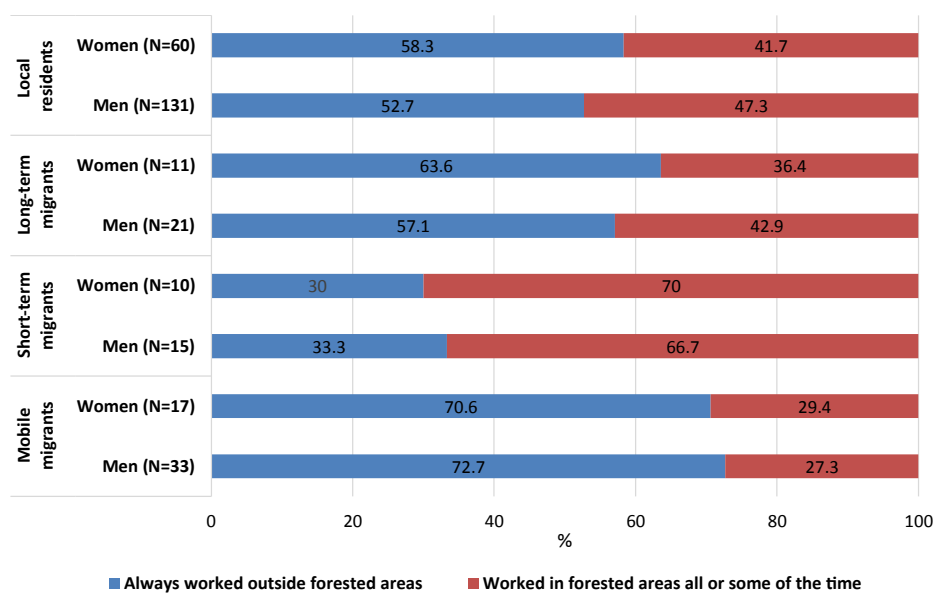
Finally, at least half of all respondents, and generally the majority of respondents in all groups, both men and women, had worked in a forested area at least some of the time in the 12 months prior to the survey, increasing their exposure to malaria (see figure 15 and 16). Ethnic minority respondents were consistently more likely to do so than Kinh respondents, particularly short-term ethnic minority migrants, of whom 82.4 per cent had lived in a forested area in the previous year. This finding recalls that in the KAP survey, which suggests that short-term migrants go to forested and/or border areas more than other respondents (see figure 10, above). However, again, due to the small sample size, these results must be treated with caution.

Figure 15: Forested areas – Location of workplace in forested areas in the 12 months prior to the survey by migration status and ethnicity (N=298)



Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Figure 16: Forested areas – Location of workplace in forested areas in the 12 months prior to the survey by migration status and sex (N=298)



Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

2.2.3. Household registration status and access to services

All of the long-term migrants interviewed had registered with the local authority, as had 99 per cent of the local residents (see table 18). However, the majority of the mobile migrants (68.6%) and nearly half of the short-term migrants (48%) had not.

Table 18: Household registration status by migration status (people) (%)

	Mobile migrants (N=51)	Short-term migrants (N=25)	Long-term migrants (N=33)	Local residents (N=191)	Total (N=300)
KT1	2 (3.9)	2 (8.0)	12 (36.4)	186 (97.4)	202 (67.3)
KT2	0 (0.0)	3 (12.0)	7 (21.2)	2 (1.0)	12 (4.0)
KT3	0 (0.0)	4 (16.0)	8 (24.2)	1 (0.5)	13 (4.3)
KT4	14 (27.5)	4 (16.0)	6 (18.2)	0 (0.0)	24 (8.0)
Not registered	35 (68.6)	12 (48.0)	0 (0.0)	2 (1.0)	49 (16.3)
Total	51 (100.0)	25 (100.0)	33 (100.0)	191 (100.0)	300 (100.0)

Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: KT1 is permanent residence; KT2 is residence in another district of the province in which a person has KT1 status; KT3 is residence in a province other than that in which a person has KT1 status (a temporary renewable residence permit of six-to-twelve months is generally granted in this case); and KT4 applies to individuals without a family, in contrast to the other three categories, and is granted for residence in any place other than that in which a person has KT1 status (a temporary renewable residence permit of three months is generally granted in this case). Some migrants may relocate without registering their movement at all.⁷⁰

There are a number of barriers that prevent migrants and other mobile people from registering with the local authorities. Those migrants who are temporary hires – who work for one employer for a week, then move on to work for another employer for another week, and so on – are often unable to register because few of these employers agree to be their sponsor for such a short period; even when they do, it may not be worth the effort involved. In addition, migrant workers do not always have the required documents for registration (a copy of their identity card and two photographs), and often the distance between remote work sites and the local authority office creates further difficulties:

Getting an identity photo takes a lot of time ... I've already collected all the ID cards [of the migrant workers at the site] but I haven't been able to do their registration because I don't have their photos.⁷¹

There are also financial issues: migrants have to pay a fee (VND 5,000/month/person) to become and remain registered. At the same time, if they are not registered, they risk paying a fine.⁷²

A lack of registration and therefore a lack of any residency status, in turn means that people encounter difficulties in accessing public social services and formal channels of information about the prevention and treatment of malaria, and are unable to benefit from malaria-control interventions carried out by local government and other organizations. This makes migrants, particularly the mobile and short-term migrants who are least likely to be registered, more vulnerable to malaria.

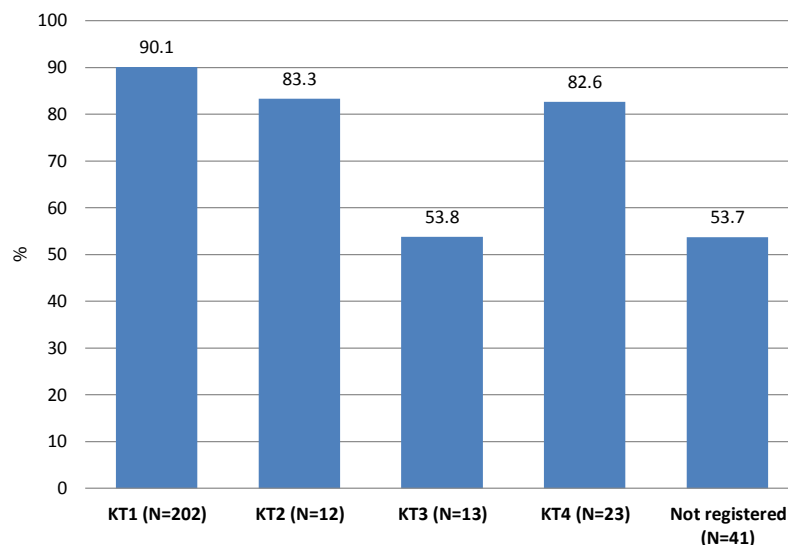
This vulnerability can be clearly seen in the data on the distribution of ITNs by the NMCP (see figure 17). Only 53.7 per cent of the respondents who were not registered said they had received a free ITN through this programme, compared to 90.1 per cent, 83.3 per cent and 82.6 per cent of those with KT1, KT2 and KT4 status respectively. These results tally with those from the KAP survey (see figure 6, above), which showed that mobile and short-term migrants were less likely than long-term migrants or local residents to receive free ITNs from the NMCP. However, there is an exception: here, KT3 residents seem to have lower access to free ITNs than other registered respondents. This observation merits further enquiry.

70 United Nations. *Internal Migration: Opportunities and challenges for socioeconomic development in Viet Nam*. Ha Noi, 2010. Available from www.un.org.vn/en/publications/publications-by-agency/doc_details/173-internal-migration-opportunities-and-challenges-for-socio-economic-development-in-viet-nam.html. Accessed 20 June 2016.

71 In-depth interview with a supervisor of a rubber plantation site, 12 August 2015. This person is responsible for registering the migrant workers who work under his supervision. These migrants will need to go to the nearest town to get photographs if they don't have any available.

72 In-depth interview with a supervisor of a rubber plantation site, 12 August 2015.

Figure 17: Proportion of respondents who received free ITNs by registration status (% of total in each registration category) (N=291)

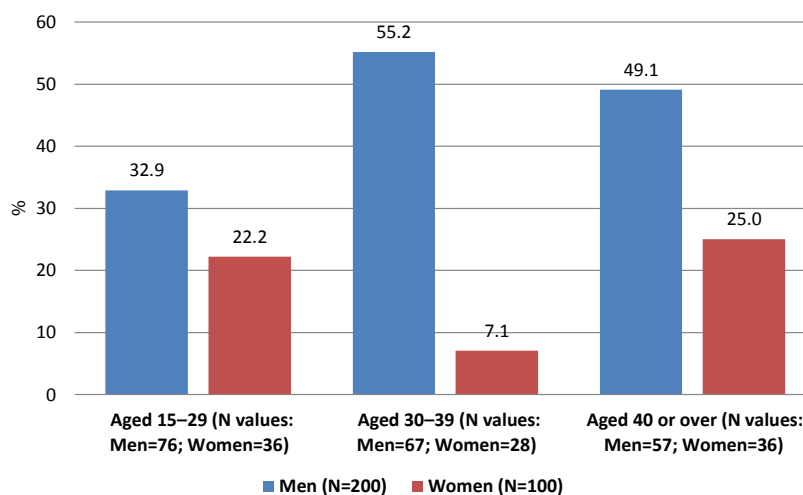


Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

2.2.4. Malaria incidence and experience

Figures 18 and 19 show the proportions of respondents who reported having experienced malaria in the five years prior to the survey by age group and sex, and by ethnicity and sex. There are several clear patterns: a greater proportion of men than women; of people aged 30–39 or 40 and over than those aged 15–29; and of Kinh people than ethnic minority people (particularly men) have experienced malaria in the past five years.

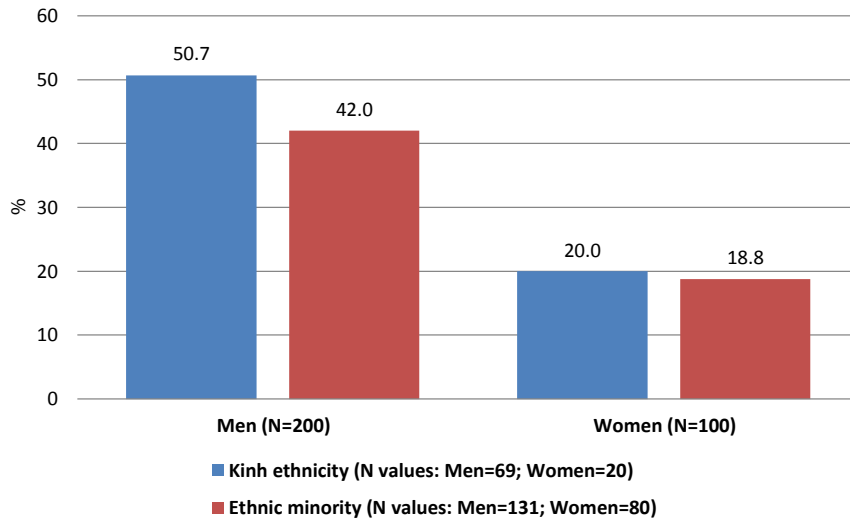
Figure 18: Proportion of respondents who reported contracting malaria in the five years prior to the survey by age group and sex



Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: These data are based on responses relating to the most recent malaria incident. The data include the sub-sample of 50 malaria patients obtained from the CHC list. The analysis was also run on the data without the sub-sample and the results were not distinguishable. N=300.

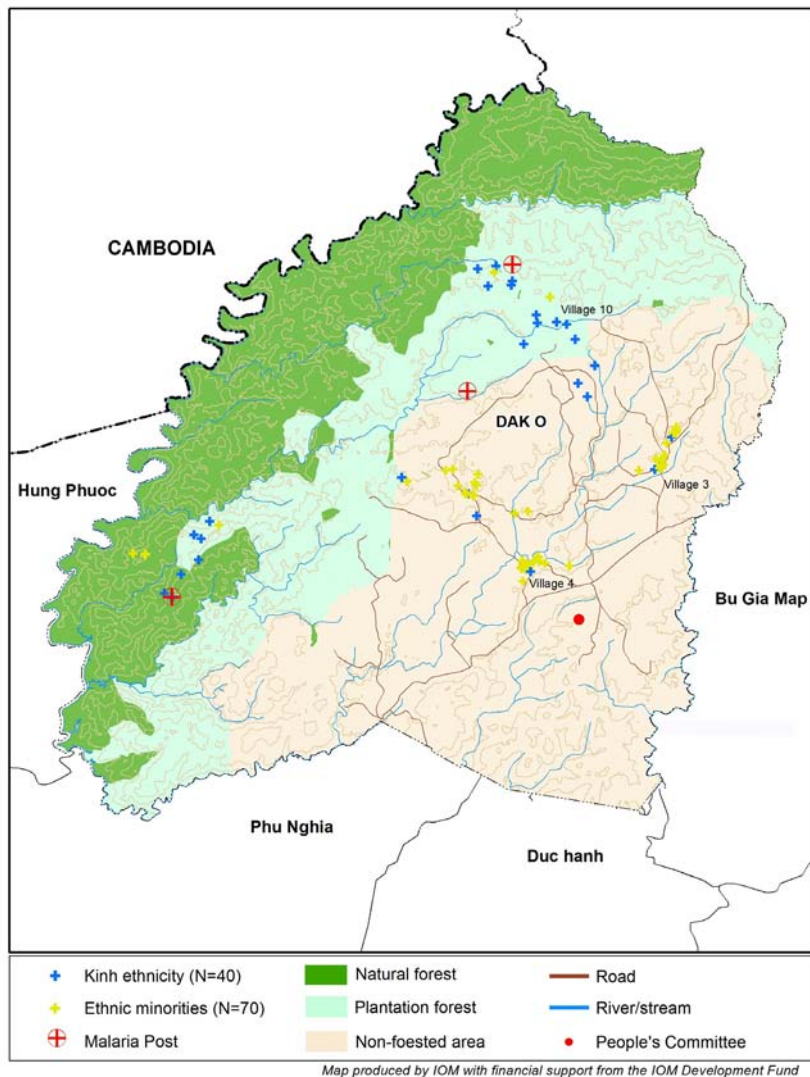
Figure 19: Proportion of respondents who reported contracting malaria in the five years prior to the survey by ethnicity and sex



Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: The data include the sub-sample of 50 malaria patients obtained from the CHC list. The analysis was also run on the data without the sub-sample and the results were not distinguishable. N=300.

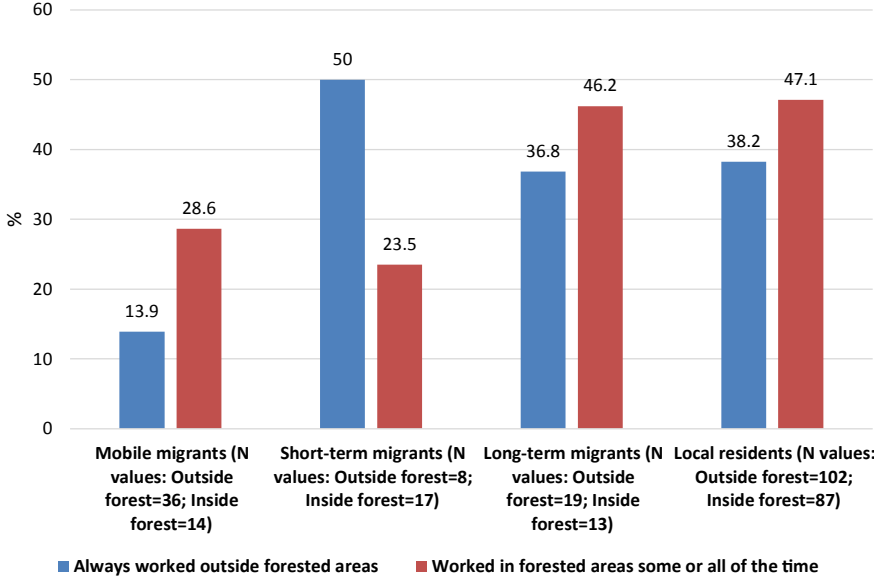
Map 10: Geographical distribution of respondents who contracted malaria between 2010 and 2015 by ethnicity



Source: Map produced by IOM based on the IMPE HCMC in-depth survey 2015.

A greater proportion of respondents who had worked in forested areas reported experiences of malaria in the five years prior to the survey (with the exception of short-term migrants) than of those who had always worked outside forested areas. This result is also proportional to the time spent in a residence in a forested area (see figures 20 and 21). However, the link between working in forested areas and the risk of contracting malaria is not statistically significant; see below (table 19) for more details.

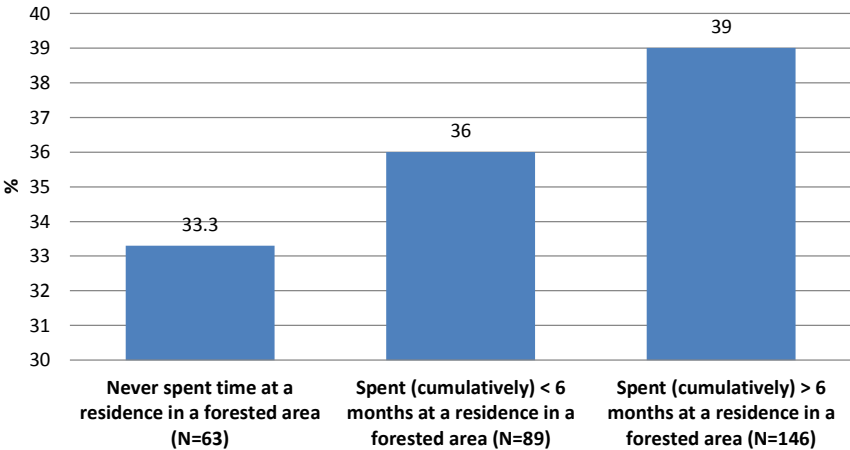
Figure 20: Proportion of patients who reported contracting malaria in the five years prior to the survey by working environment and migration status (N=296)



Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: The data include the sub-sample of 50 malaria patients obtained from the CHC list, and therefore risks make the sample biased towards malaria incidence among the long-term migrants and local residents. N=296.

Figure 21: Proportion of respondents who reported contracting malaria in the five years prior to the survey by time spent at a residence in a forested area (N=298)



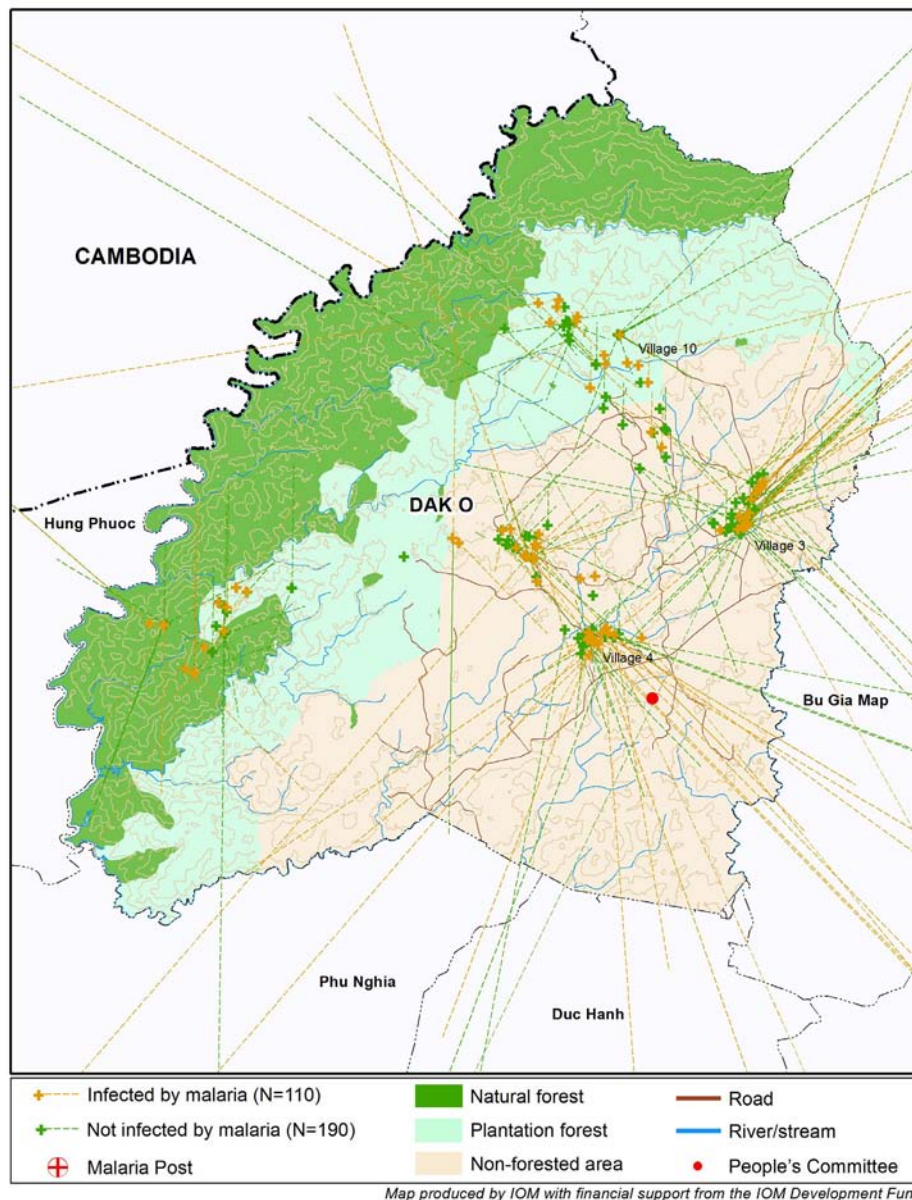
Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: The data include the sub-sample of 50 malaria patients obtained from the CHC list. N=298.

As map 11 shows, there is no obvious link between travel to work sites and malaria incidence: both respondents with malaria and without malaria have travelled throughout and beyond the province, and through high-risk places such as forested areas. It is important to note that this observation is only partly accurate since it is based on the assumption that the mobility pattern of respondents, for example travel to work place, remains about the same over the last five years.⁷³

73 We are comparing travel to current (or previous work place of the last 12 months before the survey, for example the period August 2014–August 2015) with malaria incidence that occurred within the period 2010–2015.

Map 11: Travel from current/previous work sites by malaria infection



Source: Map produced by IOM based on the IMPE HCMC in-depth survey 2015.

Further multivariate logistic regression analysis confirmed the relationship between sex, age and risk of contracting malaria. As table 19 shows, both sex and age are good predictors of malaria infection. Men are around four times more likely to get malaria than women (or in other words, the likelihood of women contracting malaria is only 0.256 times that for men). Similarly, people aged 40 and over are twice as likely to contract malaria than people aged between 15 and 29, and there is no significant difference between those aged 30–39 and those aged 40 and over. In addition, this analysis suggests that while being mobile or a migrant tends to result in less knowledge about malaria and limited access to malaria services (see the KAP findings in sections 2.1.4 and 2.1.3.2 above), there is no significant difference in the risk of actually contracting malaria between the four groups studied, other things being equal. The likelihood of mobile migrants getting malaria is only 0.232 times that for local residents (although this is possibly attributable to the shorter length of time they have been exposed). Meanwhile, other variables which might be expected to have some effect on the likelihood of contracting malaria – education, marital status, ethnicity, income, location of primary and secondary residences, location of workplaces in relation to forested areas, and whether respondents often bring mosquito nets when they work in forested areas – are not statistically significant predictors of malaria.

It should be noted again that the small size of the study means that these results should be interpreted with caution: the effects of the variables may not be visible with so few respondents. The regression model does suggest that there are links between sex, age, duration of stay in Dak O, and malaria incidence.

Table 19: Multivariate analysis: logistic regression: Malaria incidence 2010–2015

Malaria in 2010–2015	
Sex	
Female	0.256***
Male	1
Age	
15–29	0.434*
30–39	0.756
40+	1
Education	
Primary	1.899
Lower secondary	2.016
Upper secondary+	1
Marital status	
Single	1.049
Ever married	1
Ethnicity	
Kinh ethnicity	1.706
Ethnic minority	1
Income	
Under VND 3,000,000	1.338
3,000,000 to 4,999,999	1.368
5,000,000 or more	1
Location of residence(s)	
In residential area only	0.997
In both residential and “ray”/forested areas	1.219
In “ray”/forested areas only	1
Place of work	
In forest all or some of the time	1.511
Outside the forest all the time	1
Bring mosquito nets to work site	
No	1.07
Yes	1
Migration status	
Mobile migrants	0.232***
Short-term migrants	0.714
Long-term migrants	0.873
Local residents	1

Source: IOM calculations, based on the IMPE HCMC in-depth survey 2015.

Note: The data include the sub-sample of 50 malaria patients obtained from the CHC list, and therefore risks make the sample biased towards malaria incidence among the long-term migrants and local residents.

3. CONCLUSION AND RECOMMENDATIONS

3.1. Conclusion

The results of both surveys contribute to a better understanding of the different migration flows and mobility patterns and their links to malaria prevention, in Binh Phuoc Province. The data show that there are a number of specific factors that make different groups of migrants and mobile people more vulnerable to malaria than local residents. They also indicate that more targeted and migrant-friendly malaria programming is necessary to ensure effective malaria-control activities for members of these groups. Indeed, while the findings need to be interpreted with caution – for reasons discussed above, including the survey sampling methods and sample sizes – they do provide valuable insights which could be investigated further in similar contexts, such as provinces in the Central Highlands of Viet Nam.

3.1.1. Mobility patterns

The in-depth survey also showed that the patterns of mobility in Binh Phuoc are complicated, with longer-distance mobility (such as people travelling into the province from outside) only form one part of the picture. It seems that both migrants/mobile people and local residents can be very mobile over shorter distances, such as within a commune. Indeed, the majority of respondents (although fewer local residents) have a secondary residence closer to their work site where they sleep. Very often, this secondary residence is located in “ray” or a forested area, increasing their vulnerability to malaria particularly when people do not take a mosquito net with them. This pattern can be linked to the nature of conditions in the province which is mountainous, making transportation difficult and expensive, and also the fact that the major livelihood activities are agricultural or take place in forests. It is likely that such mobility occurs in other provinces in Viet Nam’s Central Highlands, which have similar geographical and employment characteristics and where malaria is also highly prevalent, and that people living there are also at increased risk of malaria.

In addition to such short-distance mobility, both migrant/mobile and local respondents in the in-depth survey reported travelling often to other places in the province, to other provinces and even to Cambodia to find seasonal work. Since malaria is endemic in Cambodia and in Dak Nong (a province bordering Binh Phuoc, reportedly an attractive destination for seasonal labourers), the transfer of malaria between communities is very likely. This can lead to localized outbreaks of the disease – such as when a group of people return from an endemic area carrying malaria parasites, which can then be spread to others by mosquitoes – and make it difficult to monitor, plan and implement malaria programming, especially if disaggregated data is lacking.

3.1.2. Vulnerability to malaria

As the logistical regression exercises showed, the surveys did not establish a *direct* link between migration/mobility *in and of itself* and vulnerability to malaria – that is, they could not show that, *all else being equal*, migrants and mobile people were more likely to contract malaria than local residents. However, they did identify a number of factors that affect vulnerability to malaria, and that are reported by more migrant and mobile respondents than local residents (and, often, long-term migrants). For example, a major barrier for short-term migrants and mobile people in particular is a generalized lack of access to all public and social services. This includes malaria prevention and treatment, due to the fact that many of them are not registered in the commune where they live. This makes them both more vulnerable and harder to access. There are a number of additional key factors:

- Access to malaria-specific information and services:
Mobile and short-term migrants are more than three times less likely than local residents to have heard of malaria. They also tend to live further away from health facilities and are less likely to have access to ITNs.
- Knowledge:
Short-term migrants have a much lower level of knowledge about malaria than other respondents.

- Health-care seeking behaviour:
“Short-term migrants” wait longer than “long-term residents” before seeking treatment for malaria.
- Exposure:
Short-term migrants and mobile people are more likely than long-term migrants or local residents to live in primitive or temporary structures, and to spend more time in structures located in “ray” or forested areas. Mobile, short-term and long-term migrants also tend to live closer to forest, although long-term migrants and local residents live more in proximity to stream.

Other factors impacting on vulnerability to malaria

The survey also highlighted factors that have an impact on vulnerability to malaria, independently of migration status. These (unsurprisingly) reflect wider issues relating to access to services among women, ethnic minority people and those with lower levels of education, as well as the interlinkages between these issues (women and ethnic minority people, for example, are less likely to have completed as much formal education as men and/or Kinh people).

- Education:
An individual’s level of education is significantly predictive of their level of knowledge about malaria and their ability to protect and treat themselves. People with lower levels of education are less likely than those with higher levels of education to be knowledgeable about malaria and to use mosquito nets, particularly when they sleep overnight in forested areas. People who are illiterate or have only completed primary education are less likely than people who have higher levels of education to complete the full course of treatment prescribed when they contract malaria.
- Belonging to an ethnic minority:
Ethnic minority people tend to wait longer before seeking treatment when they experience malaria symptoms, and are less likely to complete the full course of prescribed treatment, than people belonging to the majority Kinh ethnic group.
- Gender:
Men are more exposed than women to malaria since they travel more often to forests and border areas, and they are more likely than women to contract malaria. However, women – particularly mobile and short-term migrants – are less likely to complete the full course of treatment prescribed. Ethnic minority women have less specific knowledge about malaria prevention methods (other than mosquito nets) than ethnic minority men.
- Marital status:
Single people have lower levels of knowledge about malaria than married people.
- Age:
People aged 30 years and above are more likely to have experienced malaria in the previous five years than younger people.
- Income:
People who earn within the middle-income range (between VND 3,000,000 and 5,000,000/month) are more likely to travel to forests or border areas and are therefore more at risk than those in other income brackets.

Qualitative evidence from the in-depth study points to additional specific risks for certain groups of people who are exposed to malaria risk during the hours when *Anopheles* mosquitoes are most active. This includes those who live in areas where well water is scarce and therefore bathe in streams in the evening or at night (especially women, who cannot bathe during the day) and cassava-plantation workers who start their day early in the morning or work until the late evening. For these people, mosquito nets and other protective measures (such as mosquito coils worn in caps) are of no use. Further study is needed to identify feasible solutions to address the particular challenges of protecting these groups of people.

3.1.3. Programming and outreach implications

The study results have several implications in terms of malaria programming and outreach.

- Access to information about malaria

Those respondents who had access to three or more different sources of information had significantly better knowledge about malaria than those with less access to information. Village health workers appear to be one of the most effective sources of information, besides television, radio, family members and neighbours. People who reported that their village has a health worker were more than six times more likely to have heard of malaria than those who did not. However, it seems that village health workers do not reach all residents: they appear more successful with long-term migrants than with other respondents. This may be a function of their presence in a village, or of residents' awareness of this presence: 71.5 per cent of long-term migrants reported living a village with a health worker, compared to between 46.0 per cent and 56.7 per cent of respondents from the three other groups. Where people are simply unaware of the presence of a village health worker, there are many ways to raise awareness among all villagers – both migrants and non-migrants – about such a useful resource, including the dissemination of the health worker's contact details at schools and through mass organizations. The Women's Union may be a particularly important partner, as the proportion of mobile women who reported having heard of malaria from a health worker is low.

In addition, the impact of awareness-raising interventions can be increased through other methods. It was noted by some respondents that such activities are often conducted in October or April, when seasonal migrants arrive in large numbers. However, this is also the busiest time for workers, particularly seasonal workers, who are likely to be focused on working and earning income and not necessarily receptive to public health interventions. To be effective, malaria-related awareness-raising efforts therefore need to be more creative: for example, information and flyers could be disseminated at the main bus stations – the first entry point for migrants – where they are more easily targeted and not yet fully preoccupied by work.

- Mosquito net access and use

Mosquito nets are undoubtedly an essential prevention method in Binh Phuoc: they are cheap, and almost all respondents reported having at least one household net, with a large majority using the net(s). A significant proportion of the respondents – including nearly half of long-term migrants and local residents – had received free ITNs distributed by the NMCP. However, the limited access to free ITNs among mobile and short-term migrants is a significant concern. This lack of access can be linked to the absence of reliable statistics on these two groups of migrants, as around half are not registered (according to the in-depth study data). This makes it difficult for local health authorities to plan for and distribute free ITNs to such migrants, and more creative measures and initiatives – including improved coordination – will be necessary to overcome this challenge. The quality and effective use of nets – one respondent from the in-depth study reported using their free ITN as a fishing net – is another concern, one that can be addressed through better consultation and communication with the local community.

It should also be noted that while many people reported having received a mosquito net distributed by the NMCP, very few were aware that these were ITNs. This suggests a need for more efforts on the part of the NMCP during ITN distribution to ensure that beneficiaries understand how ITNs are different to nets bought at the market and why it is important to use them. In addition, women seem to be particularly receptive to ITNs: they are more likely to report both having received a mosquito net from the NMCP and that the net they are using is either an ITN or a normal mosquito net bought at the market and treated with insecticide later. Advocacy efforts may therefore be more effective when they target women, and women can transmit advocacy messages onward to their families and communities.

Where ITNs and other bed nets are less practical – such as when people sleep at work sites and/or in the forest – the reported practice of using hammocks with a net provides a good alternative. However, although this solution is convenient and highly effective in preventing mosquito bites, it is relatively expensive and therefore not accessible to all. The use of a blanket as a substitute for a net is considerably less effective.

When planning future malaria programming in this and similar contexts, the distribution of hammocks with nets should be considered, as these may be more appropriate to the needs of a significant part of the local community. At the same time, further study and programming are needed to identify and address other barriers to the use of mosquito nets (such as the reported fact that the distributed ITNs are not big enough).

- Coordination of malaria prevention and treatment services

The survey data indicated that malaria services at the village level, and at border posts, are generally good, with village health workers, commune health centres and agency health workers collaborating well together. This is unsurprising given that malaria is a priority issue for the local health-care system, and has received a lot of attention from the authorities. In addition, relationships have been cultivated between the public health system, the private sector (including pharmacies and employers) and the local community to promote malaria prevention practices. However, malaria services remain too heavily focused within the health sector (where stakeholders often act in isolation) and interagency coordination and collaboration are not sufficiently developed. There is a lack of consistency in some areas of malaria prevention at the community-wide level (such as varying levels/effectiveness of insecticide spraying). Employers need to be mobilized to provide more protection to workers (especially those who work at key hours of the day). More efforts need to be made to link malaria control with other health-related initiatives and socioeconomic development objectives, including those aiming to empower local residents, migrants and mobile populations and involve them in public health provision.

The involvement of mass organizations (such as the Women's Union and Youth Union), village leaders, schools and pharmacies in raising awareness of malaria is limited, with key staff in these entities often misunderstanding key issues of malaria control. Schools in particular could play a more important role in disseminating information about malaria, with children passing on such information to their parents and teachers using teacher-parent meetings to increase knowledge. This could have fairly immediate impacts, and malaria programme planning should therefore include a review of school curricula and involve schools in efforts to raise awareness about malaria for children in malaria-prone areas.

A lack of coordination also restricts access to services – such as ITN distribution – that are impeded by the fact that many migrants are not registered. Improving coordination between the health and non-health sectors (such as the police or Departments of Labour, Invalids and Social Affairs), as well as with other stakeholders (such as farmers/plantation owners) will be essential to improving malaria prevention and treatment services.

Finally, although a significant number of migrants and mobile people maintain ties with their province of origin, interprovincial coordination does not seem to be effective. The qualitative data from the surveys suggest that while people often decide to return home for a rest or in order to be taken care of by their family, it is difficult for them to access malaria services there. Interprovincial coordination, including between health centres, can therefore be improved – in this case particularly with those provinces from which significant numbers of people move to Binh Phuoc⁷⁴ – in order to ensure treatment efficacy and proactive outreach to prevent the reintroduction of malaria in non-endemic areas and the spread of artemisinin resistance.

3.2. Recommendations

3.2.1. Policy recommendations

- Design and conduct targeted behaviour change communication programmes for both migrant and local residents in Binh Phuoc, taking into account the specific vulnerabilities and characteristics of each group identified by the studies (and using the KAP survey results as a baseline). Increase the role of dissemination methods that have proven effective - village health workers, TV and radio – and those that have potential (including schools, mass organizations and pharmacies).

74 Lang Son, Bac Kan, Tuyen Quang, Nam Dinh in the North, Thanh Hoa, Nghe An in the Northern Central area, Dak Lak, Lam Dong in the Central Highlands, Dong Nai, Binh Duong, Tay Ninh, Ba Ria-Vung Tau, Ho Chi Minh City in the South East, Dong Thap, Soc Trang, and Ca Mau in the Mekong Delta.

- As part of this strategy, raise awareness of the presence and role of village health workers.
- Adapt malaria prevention services in line with the survey results: provide different sizes of ITNs (individual and family) and improve ITN quality; distribute or subsidize the cost of hammock with nets. Ensure that feedback and suggestions from beneficiaries and others in the local community are systematically collect in order to ensure that malaria services (including spraying practices) are appropriate to local needs.
- Improve routine monitoring record templates and processes to collect disaggregated data at the community health centre level, including migrant status; registration status; permanent and current address; mobility patterns (frequency of stay in forest per year); place where malaria was contracted; intention to move during treatment. This will help to improve treatment adherence, and could contribute to targeting behaviour change communication strategies. As migrant definitions remain a challenge, a small-scale pilot could be conducted to test the migrant classification method proposed in the in-depth study.
- Formulate a long-term malaria-control strategy targeting migrants and mobile people at the national and provincial levels, as well as the commune level, which takes into account and address the vulnerabilities factors specific to them. This strategy must ensure coordinated efforts between sending and destination provinces and between health and non-health sectors (including police, labour and mass organizations, schools and the private sector), and identify creative solutions to overcome existing challenges, particularly the lack of access to malaria services due to registration status. Such a strategy must be evidence-based, and should take into account the evidence provided by this study and on future studies.

3.2.2. Research recommendations

- Replicate and enhance the research methodology piloted under this survey, especially the migrant classification method, in other provinces.
- Conduct further research on the links between: i) malaria and migration status (mobile/ migrant groups compared to local residents); and ii) malaria vulnerability and occupation. In the context of the study in Binh Phuoc, the first question (i) was not clarified due to the lack of a specific timeframe for malaria incidence in the KAP survey and the small sample of the in-depth study; while for the second (ii) classifying occupations in the context of seasonal and multiple occupations was a challenge that could not be resolved.
- Conduct operational research to investigate the specific vulnerability of those groups of people for whom traditional vector control methods are not fully effective (cassava workers and those, especially women, who have to bathe in streams), and identify ways to protect them.

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