

## Research Article

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# Knowledge, practices and gender discrepancies of migrant labours concerning malaria in Bhubaneswar, Odisha, India

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## ABSTRACT

**Background:** Bhubaneswar, the capital of Odisha is an up-coming city since 1960s. The capital is undergoing various developmental activities and rapid industrialization. This is leading to migration of labours from various districts of Odisha including malaria endemic districts. The records available in central malaria laboratory, Bhubaneswar revealed high malaria incidence (ranged from 5% to 11% during last five years).

**Methods:** The study was undertaken in Bhubaneswar, Odisha, India, on migrant labours (300 samples) through a pre-structured schedule.

**Results:** The study revealed the migrated respondents were from malaria endemic districts of Odisha. The malaria endemicity of the districts ranged from 2.2-9.8. It was also found that only 6% of the migrants were from low endemic areas i.e. SPR<5 But another 94% of the migrants were from high endemic areas i.e. SPR>5. Study of the awareness of the respondents showed 31% males and 9% females knew mosquito bite as a cause of malaria. Rapid Diagnostic Test showed twenty seven numbers of respondents tested positive for malaria (24 positive for PF and 3 positive for PV), out of them 6 were males and 21 were females. The study of their sleeping habits and personal protection methods showed that 32% respondents slept outdoor and 73% did not use anything as protection against mosquito bite. The study regarding knowledge of malaria signs and symptoms among respondents showed that the most commonly recognized signs and symptoms of malaria were headache (23%). Vector incrimination study showed that per man hour density of *an. stephensi* is 5.7.

**Conclusions:** Thus presence of efficient malaria vectors and inadequate knowledge in the migrant labour community and emphatically among female migrant labours regarding cause, symptoms, prevention, control measures and risks associated with malaria is the major reason of malaria transmission.

**Keywords:** Migrant labour, Malaria endemicity, Knowledge of malaria, Gender, Urban malaria, Parasite reservoir

## INTRODUCTION

Human migration is an important factor in malaria transmission. WHO in its review has recognised differences in gender roles, norms and access to resources in development of malarial disease. An estimated 0.7 to 2.7 million people die of malaria each year globally.<sup>1</sup> It has been observed that in Orissa state, with only 3% population of India contributing around 23 % of total

reported malaria cases, 40% of *P. falciparum* infection and 17% of total reported malaria deaths of the country.<sup>2</sup>

Bhubaneswar, the capital of Odisha is an up-coming city since 1960s. The capital is undergoing various developmental activities and rapid industrialization. This is leading to migration of labours from various districts of Odisha including malaria endemic districts. The records available in central malaria laboratory, Bhubaneswar,

Odisha, India revealed high malaria incidence (ranged from 5% to 11% during last five years). Despite the documentation of numerous health compromising factors, some studies have emphasized the value of adequate knowledge of malaria in order to ensure that people apply preventive measures and seek prompt and appropriate treatment for themselves and their dependants.<sup>3,4</sup> In view of the facts stated above, the present study "Knowledge, Practices and gender discrepancies of migrant labours concerning malaria in Bhubaneswar city, India" is undertaken.

## METHODS

The selection of the city of Bhubaneswar was based on its climatic condition, rapid deforestation, housing and infrastructure development work which attracts the labour population from different endemic districts of the state.

### Geographical situation and population of Bhubaneswar

The city lies with 20°11' to 20°21'N latitude and 85°47'E to 85°52'E longitudes. The entire city can be categorized in to three broad altitude zones, the southern zone with altitude between 20m to 40m above MSL, (Mean Sea Levels), the middle zone (core of the city) with average altitude at 40m above MSL whereas the northern part of the city has an average altitude range between 65 to 85 m above MSL. The demographic data available from municipal corporation reveals the population of the city is 8,37,737 (2011 census).

The nine numbers of labour chowks were purposively selected as these places are earmarked for daily recruitment of large scale migrant labour population. Near about, 3,000 labour populations gather there for daily recruitment.

10% random sampling method has been employed and 300 labour migrants were randomly selected from these labour chowks for collection of data using a structured field-piloted questionnaire (Participatory Rural Appraisal (PRA) tools were employed) to get the information. Malaria cases were evaluated by rapid diagnostic tests.

**Entomological survey:** Adult mosquito and larval collection were done fortnightly from the slums following the standard entomological procedures.<sup>5</sup> The following entomological parameters were studied.

**Vector prevalence:** Mosquitoes were collected during morning and evening hours by using sucking tube, mechanical aspirator. All anophelines routinely collected were identified with the standard key of christophore.<sup>6</sup>

**Larval collection:** Larvae were collected from more than 90 different types of breeding places such as rice field, drains, sewerage line, cess pits, cess pool and Inter domestic breeding spots like overhead tanks, septic

tanks, domestic water reservoirs, unused pots and water logged areas were done. The larvae were reared till adults and identified.

## RESULTS

**Origin of migrant labours:** The study showed the migrated respondents were from malaria endemic areas (Figure 1) with SPR (Slide Positivity Rate) ranging from 2.2-9.8 (Table 1). It was also found that only 6% of the migrants were from low endemic areas (Khurda, Nayagarh, Mayurbhanj) i.e. SPR<5. But another 94% of the labour migrants were from high endemic areas (Keonhar, Angul, Dhenkanal, Ganjam, Gajpati) i.e. SPR>5.



**Figure 1: Map of Odisha showing origin of migrants and Bhubaneswar city, India.**

**Table 1: Distribution of migrant labour respondents from different districts of Orissa and respective district SPR, 2012 (slide positivity rate), N=300.**

Districts	Migrant labour respondents (%)	SPR (%)
Khurda	2	2.2
Nayagarh	3	4.1
Keonjhar	9	9.8
Angul	11	8.74
Dhenkanal	10	8.2
Ganjam	48	5.7
Gajpati	13	9.72
Mayurbhanj	1	2.4

\*District wise distribution of migrant labours (N=300), author's data, \*The data of SPR of respective districts collected from NVBDCP office Bhubaneswar

### Migrant labours' knowledge and practices study on malaria

**Gender, age and education of respondents:** Out of the 300 respondents 153 were males and 147 females. Highest respondents belonged to 18 to 30 years (all respondents belonged to 18-60 age groups). As regards to the education status of the respondents 53% had no formal education, 27% had primary education, 15% with secondary education and 5% were post matric.

**Knowledge about malaria:** Out of 300 respondents only 40 percent of respondents knew malaria is caused by mosquito bite, out of this 31 percent were males and nine percent were females (Table 3).

**Table 2: The respondents stratified by gender, age and the highest level of education attained.**

Strata	Number of respondents
Gender	
Male	153
Female	147
Age groups (Years) (18-60 age respondents taken)	
<30	116
30-39	97
40-49	52
50-59	35
Level of Education	
No formal education	160
Primary education	82
Secondary education	44
Post matric	14

Thirteen percent respondents knew malaria is a fatal disease and out of which male 10% and females 3%. Rapid diagnostic test was carried out for the 300 labour migrants (Table 3).

Twenty seven numbers of respondents tested positive for malaria (24 positive for PF and 3 positive for PV), out of them 6 were males and 21 were females. When the respondents were asked regarding their fever suffering in last one month, it was found that 37 numbers of respondents suffered from fever in last one month and only nine of them consulted doctors whereas the rest 28 did not.

**Table 3: Knowledge about malaria.**

Knowledge about malaria		Yes (%)	
Is mosquito bite the cause of malaria? (n=300)	40	31 Male	
		9 Female	
Is malaria a fatal disease? (n=300)	13	10 Male	
		3 Female	
No of respondents found positive for malaria parasite (rapid diagnostic test) 27/300)	27	6 Male	
		21 Female	
Number of respondents suffered from fever within last one month and consulted doctor (n=300)	37	9 Consulted doctor (all males)	
		28 Did not consult doctor (2 males and 26 females	

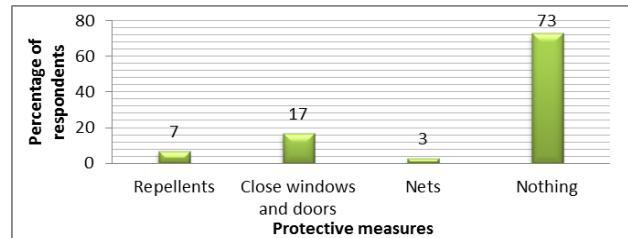
Out of the above 37 members, 11 were males and 26 were females (out of 11 males nine consulted doctor but no female respondent consulted doctor) (Table 2). However, when these 37 respondents were surveyed for malaria signs and symptoms during their suffering from fever, 24 respondents answered they suffered with at least four signs and symptoms of malaria (high fever, chill, headache, vomiting).<sup>7</sup>

**Population movement:** The study also revealed that 70% of the respondents move to their native places in about

three month's interval, 11% visited in every month, 7% visited once in six months and rest 12% in occasions.

**Sleeping habit and personal protection methods:** The collected data showed that 58% percent of respondents sleep indoors, 32 percent sleep outdoors and 11 percent sleep outdoors with bare body.

Seventy three percent of respondents used nothing to get protected against mosquito bite and only three percent used mosquito nets (Figure 2).

**Figure 2: Personal protective measures taken by the respondents to avoid mosquito bites.**

**Respondent's knowledge of malaria signs and symptoms:** The study showed that the most commonly recognized signs and symptoms of malaria were headache (23%), chills (18%), high fever (10.7%), vomiting (9.3%) and the remaining respondents told of other symptoms (Table 4).

**Table 4: Respondent's knowledge of malaria signs and symptoms (n=300) (Malaria signs and symptoms were chosen with reference to Hlongwana et al.).**

Signs and symptoms	Number of respondents	Percentage of respondents
Headache	70	23.3
Chills	54	18
High fever	32	10.7
Vomiting	28	9.3
Loss of energy	22	7.3
Body pain	20	6.7
Delirium	11	3.7
Loss of appetite	11	3.7
Do not know	40	13.3

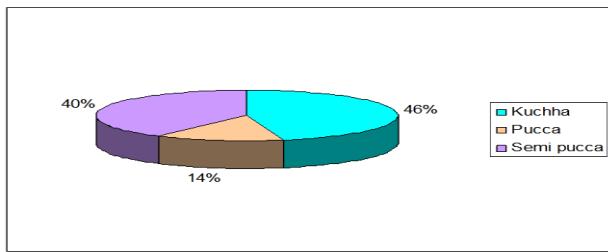
**Table 5: Number of signs and symptoms of malaria as identified by the respondents.**

Number of malaria signs and symptoms respondents could identify	Percentage of responses
>6	3
5	10
4	15
3	13
2	17
1	35
0	7

The study of knowledge of respondents regarding signs and symptoms of malaria revealed that seven percent of respondents could not mention even one sign or symptoms of malaria, whilst 65% of respondents could identify only 1 to 3 symptoms of malaria and rest could identify more than one symptom (Table 5). Living condition:

#### **House type of labour migrants**

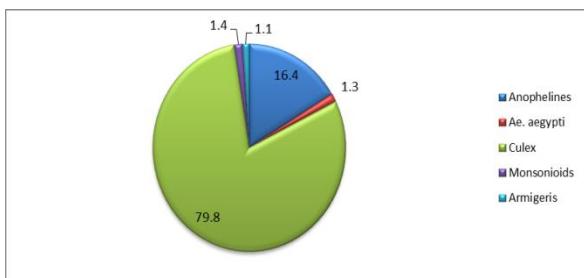
While studying the type of houses of the respondents at destination it was observed forty six per cent of the respondents stayed in kuchha houses followed by semi pucca (40%) and pucca (14%) (Figure 3).



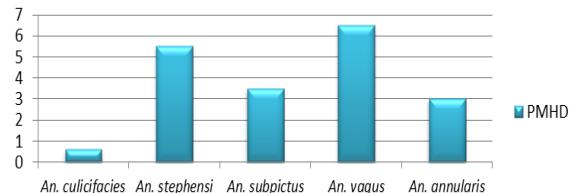
**Figure 3: House type of labour migrants.**

**Entomological survey:** A total of 1982 adult mosquitoes belonging to five genera viz. *Aedes*, *Anopheles*, *Culex*, *Mansonioides* and *Armigeris* were collected. Three known vectors of malaria *An. annularis*, *An. culicifacies* and *An. stephensi* were collected including the vectors of Lymphatic filariasis and dengue were also collected. Out of 90 breeding spots 29 were positive for anophelines larvae.

The potential breeding of *An. culicifacies* was found to be the rice fields and riverbed pools. *An. stephensi* was found to breed in cement tanks and in the ornamental fountains, artificial lake and also in the water logged with the vegetation. *An. annularis* was found in paddy fields with vegetation. The study of percentage of abundance of mosquitoes showed highest prevalence of *Culex* (Figure 4). However, among the anophelines PMHD of *An. vagus* was highest followed by *An. stephensi*, *An. subpictus*, *An. annularis* and *An. Culicifacies* (Figure 5).



**Figure 4: percentage of abundance of mosquitoes in Bhubaneswar.**



**Figure 5: Per man hour density (PMHD) of Anopheline mosquitoes in Bhubaneswar.**

## **DISCUSSION**

### **Population movements and malaria**

Human population movement (HPM) from higher transmission areas risks reintroduction and resurgence in malaria-free receptive areas, and has undermined elimination efforts in the past.<sup>8-11</sup> It is estimated that one-sixth of the country's population moves annually during the transmission season from malarious to non-malarious areas and vice versa.<sup>12</sup> Malaria in developing countries and tropical regions has been of special importance historically.<sup>13</sup>

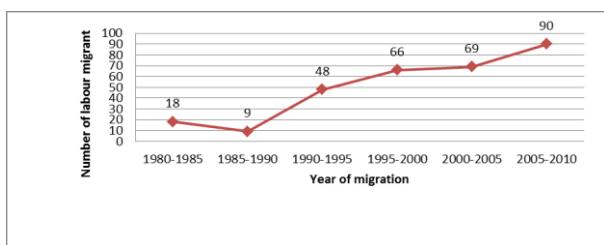
Despite considerable progress in the past decades, malaria is still considered a major public health concern in some areas. Malaria in certain regions such as sub-Saharan Africa, Thailand, and India is very prevalent and comprises approximately 95% of total malaria cases throughout the world.<sup>14</sup> In the Eastern Mediterranean Region (EMR), on average more than 10 million clinical cases of malaria occur annually, of which nearly 50,000 cases lead to death. 60% of the EMR populations (287 million people) are at risk.<sup>15</sup>

Salvado et al in Spain reported that the main cause of malaria in subjects is migration of the passengers to endemic countries.<sup>16</sup> In another study conducted by Mascarello et al in Italy during 1990-1998, the number of malaria cases was shown to have increased by 100%, and the main causes of this increase were commute and immigration from endemic areas to the country.<sup>17</sup> Also, based on Iqbal et al study, the rate of malaria infection among immigrants to Kuwait was observed to be 23%.<sup>18</sup> Population movements in malaria endemic zones and the lack of adequate intervention lead to increasing the risk of malaria. Prothero considered this phenomenon of migration to be one of the most important determinants of global health.<sup>19</sup> In this study the type of movement of the migrant population to their native places is one type of seasonal phenomenon and the migrants move from relatively low endemic areas to their native places, which are highly endemic.

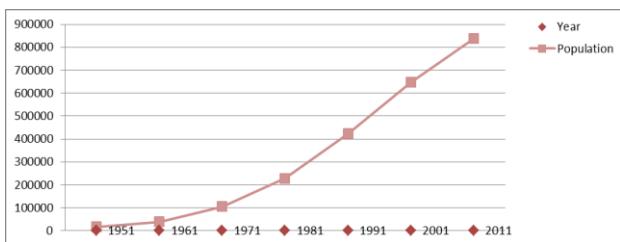
Studies have noted that improved community knowledge of malaria and its source of transmission have helped to promote preventive and personal protective practices amongst the affected populations.<sup>3,20</sup> Thus study

established a close association between knowledge of causes of malaria and disease symptoms ( $p<0.0020$ ).

Thus the result showed that inadequate knowledge of signs and symptoms, cause of malaria and its prevention appear to threaten intentions of prompt treatment-seeking practices of respondents. However, the study by Hlongwana et al showed no firm relationship between the knowledge of malaria causes and disease symptoms.<sup>11</sup> So, attention must be paid to educate the community on malaria signs and symptoms; Along with our study, other studies have established that the knowledge of signs and symptoms plays a particular role on early diagnosis and treatment.<sup>21</sup> Gender identities, status, roles and responsibilities influence vulnerability to disease, access to health care and the impact of disease for women, men, girls and boys.<sup>22</sup> The social consequences of infectious disease are often more severe for women than for men and illness imposes a particularly heavy labour burden upon women.<sup>22</sup> The increasing trend of labour migration to Bhubaneswar during last 30 years is alarming in regard of malaria transmission. The study reveals that fifty three percent of respondents came to the city (Figure 6). The study conducted by Rout on the slum growth in Bhubaneswar also showed that slum population in Bhubaneswar grew at a rate of 11.82 percent every year.<sup>23</sup> The data of Bhubaneswar Municipal Corporation showed the city has 99 authorized slums (House Hold-13420; Population-70660) and 278 unauthorized slums (House Hold-46706; Population 237947), based on census 2011, the slum population is nearly 47% of the then existing total city population. The city population is increasing exponentially (Figure 7). In the Indian context the trend of urbanization is also increasing continuously as per the data collected from urban statistics hand book 2010, National Institute of Urban Affairs, New Delhi.



**Figure 6: Trend of labour migration in Bhubaneswar city from 1980-2010 (n=300).**



Source: Bhubaneswar Municipal Corporation.

**Figure 7: Population growth of Bhubaneswar (1951-2011).**

Irrespective of the type and motive of the movement, migrants can become active transmitters or passive acquirers of certain diseases, depending on their levels of immunity, origin, and destination.<sup>9,10</sup>

Entomological survey in Bhubaneswar by RMRC (ICMR), showed presence of competent malaria vectors in the city, such as *Anopheles stephensi*, *An. culicifacies*, *An. Annularis* and also found availability of mosquitoigenic conditions and breeding sites of the vector.<sup>24</sup> In our previous vector study of Khurda district showed the prevalence of sibling complex *An. Culicifacies A, C, D* and *An. fluviatilis S* which are competent vectors of malaria.<sup>2</sup> Along with the competent vector prevalence the to and fro movement of migratory population to the endemic areas add to the malaria prevalence in the city as parasite reservoirs. Rapid developmental and industrialization activity in Bhubaneswar causes warming trend of the city which influences vector bionomics through shortening of sporogony of parasite, gonotrophic cycle, life cycle of urban malaria vector species (i.e. extrinsic incubation period or EIP shortens at higher temperature and vectors become infectious sooner and ultimately increases the man-vector contact.<sup>1</sup>

In addition to climate, other factors such as residence, personal and social lifestyle, cultural and economic status of the region, number of entered migrants to the region, and quantity and quality of malaria control programs in the region hamper the outbreak and spread of malaria.<sup>25</sup> The quantification and analysis of Human Population Movement (HPM) can be important for successful planning of both malaria control and elimination.<sup>5</sup> Patterns and magnitudes of HPM and individual infection rates differ between demographic groups.<sup>26</sup> Further differences in individual behaviors, such as bed net use and short term travel lead to variation in likelihoods of malaria movement between these sub-population groups.<sup>27</sup>

However, attempts need to be made in the present context to improve public education, surveillance, medical health services and infrastructure to avoid mosquito breeding. Well-developed and evidence-based Information, Education and Communication (IEC) and Behaviour Change Communication (BCC) materials are needed to increase knowledge in the community on symptoms, prevention and control measures, sources of treatment and care and the risks associated with delays in treatment.<sup>28</sup>

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**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee

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