## STUDY: Factors associated with visceral leishmaniasis in Bihar, India

## Background information and study methods

The purpose of this study is to identify factors associated with visceral leishmaniasis. In particular the study tries to generate evidence for the protective effect of bed nets.

Data for this study were collected in a village in Bihar, India with ± 2000 inhabitants. The village has experienced an outbreak of visceral leishmaniasis (VL) that started two years ago.

VL is a vector borne disease, spread from human to human by a vector, a small sand fly. Sand flies are assumed to bite during the night, thus sleeping under a bed net might be protective.

Though VL on the Indian subcontinent is assumed to have only humans as a reservoir, animals might play a role because they might attract more sand flies into the house.

As in tuberculosis, the immune system plays a major role in the pathogenesis of VL. Children tend to have an immune system that is not yet fully developed, which can increase the risk of developing the disease. For adults the risk is reduced because they often have been infected in the past, without developing the disease (subclinical infection). It is also known that the poorest are most at risk for VL.

The researchers conducted a house-to-house survey in which all heads of households were asked about VL cases in their households over the past two years. They included only subjects of 2 years and older. Cases reported were verified, patients reported to have died from VL in the past two years were also recorded.

For each household member, the researchers asked whether (s)he regularly sleeps under a bed net. In addition data were collected on conditions in and around the house, on ownership of animals, and on socio-economic status.

## Data to be analysed

You will find the necessary data in the Excel file VL\_Bihar.xlsx. A summary of the information to be used in this analysis can be found in the table below:

|  |  |  |
| --- | --- | --- |
| **Name of the variable** | **Content of the variable** | **Codes** |
| idnr | Identification number |  |
| sex | gender of subject | 1 = female, 2 = male |
| age | age in years |  |
| case | visceral leishmaniasis case | yes/no |
| died | subject died of VL before the interview | yes/no |
| neem\_tree | ‘neem’ tree at < 25 meters from the house | yes/no |
| bamboo\_tree | bamboo tree at < 25 meters from the house | yes/no |
| banana\_tree | banana tree at < 25 meters from the house | yes/no |
| rice\_field | rice field at < 25 meters of the house | yes/no |
| permanent\_water\_body | permanent water body at < 25 meters from the house | yes/no |
| granaries\_in\_hh | granaries in the house | yes/no |
| owngoat | owns goats | yes/no |
| ownpoul | owns chickens | yes/no |
| ownbov | owns cattle (cows or buffaloes) | yes/no |
| bednet | regular use of bednet (at least 10 months per year) | yes/no |
| asset\_index | asset index, class 1 (poorest) - class 5 (richest) - *(see \*)* | 1 - 5 |
| riskwall | house with thatched walls | yes/no |
| earthfloor | house with earth floor | yes/no |
| sc\_caste | belonging to the scheduled castes *(see \*\*)* | yes/no |

\* **Asset index**: Information on durable consumer goods owned by each household was collected. Based on this information an ‘asset-index’ was made and households were grouped into 5 groups, according to the quintiles of this index. Code 1 identifies the poorest, 5 identifies the richest.

\*\* **scheduled casts**: Another socio-economic variable collected is whether or not a subject belongs to the ‘scheduled casts’, these are the poorest casts in the area.

## Objectives of the analysis

* Identify factors associated with visceral leishmaniasis in Bihar, India.
* Formulate an advice for decision makers based on the findings of your analysis. Specifically answer the question: «Should the distribution of bednets be recommended as a strategy to reduce the incidence of visceral leishmaniasis in India?».

## Instructions

The instructions in this section are there to guide and assist you. There may be other ways to perform the analysis and present and discuss the results: it is up to you to decide to follow the instructions or not. You are however required to perform a multivariable analysis and to limit your report to a maximum of 4 pages.

The assignment consists of a **three-step analysis** and a **conclusion**:

1. Description of the study population and main epidemiological indicator(s). Description of the study population includes age, gender, and the frequency distribution of potential factors associated with visceral leishmaniasis ‘(univariate analysis).
2. Description of the association between visceral leishmaniasis and the different factors investigated in a bivariate analysis.
3. Description of the association between visceral leishmaniasis and the different factors investigated controlling for confounding in a stratified analysis.
4. Conclusion: answer the question: «Should the distribution of mosquito nets be recommended as a strategy to reduce the incidence of visceral leishmaniasis in India?»

**Expected output of the analysis**

In **step 1** the main results can be described in the text, with a complete overview in tables and/or graphs. You are expected to present a description of the study population and the main epidemiological indicator(s). The latter can be done in the form of a table. Interpret the main results of this step in a concise way. *(Step 1: 1,5 pages maximum).*

In **step 2** you are expected to present the results of the bivariate analysis, i.e. strength and statistical significance of the association with the outcome of each of the factors studied. You may present the main findings in text and use a table to provide the complete overview of all the associations studied. Interpret the main results of this step in a concise way.

In **step 3** you are asked to present the results of the multivariable analysis. Evaluate which factors are potential confounders in the association between ‘regular use of a bednet’ and ‘the incidence of VL’. Assess if indeed these factors confound the mentioned association. Also check for interactions. The most important associations can be presented in text, a complete overview can be given in a table.

Interpret the main results of this step in a concise way and especially interpret correctly the association between ‘regular use of a bednet’ and ‘the incidence of VL’, taking into account confounding or interaction if present.

**Report structure and format**

Try to write a short report of maximum 1,200 words, excluding the tables. The **structure** of the abstract should follow the “IMRAD” (Introduction, Methods, Results and Discussion) rules.

The **Introduction** should be kept short. It is not necessary to provide an extensive literature review. A few sentences to explain the justification for the study and the objectives will be enough.

The **Methods** section should be short as well. It should contain a short description of the study methodology and the type of analysis performed.

In the **Results** section, you should **describe** the **results** obtained from **the analysis** performed. There is no need to provide details of all calculations. Provide appropriate epidemiological measures and an interpretation of their strength and statistical significance.

**Tables** should be appropriate for presentation (do not copy directly the output produced by R). If you want to add **graphs** – which is not always necessary –, they should be inserted in the text.

In the **Discussion** section you are expected to **provide an in-depth interpretation** of your overall results and link them to the study objective. At the end of the discussion please add a short **conclusion** in the form of an advice for decision makers.

Regarding style, this report should be simple and easy to read.