



**Government of Nepal  
Ministry of Health and Population**

# **National Strategic Guideline on Kala-azar Elimination Program in Nepal 2014**



## **Kala-azar Elimination Program**

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## Forewords



I am glad to know that Epidemiology and Disease Control Division (EDCD) has revised its national guideline on Kala-azar in accordance with changing advances in technology and treatment. The revisions and changes have been made in accordance with the recommendations made by WHO Regional Technical Advisory Group (RTAG) and national Technical Working Group (TWG) on Kala-azar.

It is highly expected that the revision and introduction of new medicine (Liposomal Amphotericin B) and treatment regimen will significantly improve the treatment compliance and reduce disease burden as well mortality. I urge all health service providers to make full utilization of this guideline and do their best in achieving the national goal and target of KA elimination. As we know Kala-azar is a disease of poverty, multi sector involvement is equally important to sustain the gains in the long run.

I would like to thank EDCCD, TWG members, health professionals and all others who were involved in revising this guideline.

**Dr. Praveen Mishra**  
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## DEPARTMENT OF HEALTH SERVICES

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## Forewords



Kala-azar is a chronic febrile illness which is fatal if it is not detected and diagnosed timely and is not treated properly. Delayed diagnosis is associated with increased complication of the diseases, devastating economic consequences on the patients' family. Thus, Kala-azar cases have to be searched for, diagnosed and managed actively.

Recent advances in Kala-azar diagnosis and treatment has made possible to confirm the diagnosis and treat the patient at health institutions efficiently by a trained health worker. Rapid diagnostic test has made the active case detection of Kala-azar and post Kala-azar dermal leishmaniasis cases feasible in the Kala-azar endemic areas.

It gives me an immense pleasure to inform that "National Strategic Guideline on Kala-azar Elimination Program" has been revised after thoroughly analyzing the national program and current developments in disease diagnosis, treatment, case detection and vector management. This guideline will be a reference to national, regional and district level managers to guide the program to achieve elimination of Kala-azar in Nepal by the end of the year 2015. Finally, I would like to acknowledge the effort made by the team involved in revising the guideline.

**Dr. Lakhan Lal Sah**  
Director General  
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## Forewords



Nepal government is implementing activities with an aim to eliminate Kala-azar by the end of the year 2015. For this, different strategies and objectives have been formulated and active case detection and vector control activities have been intensified in the program during the attack phase of elimination. There is timely revision and adaption of strategies such as use of rapid diagnostic test and new short course therapy. The program has identified the focus area and population to control Kala-azar.

It gives me immense pleasure to express that the “National Strategic Guideline on Kala-azar Elimination Program” has been revised according to current developments in case detection, diagnosis, treatment, vector control, disease surveillance and recording and reporting of the Kala-azar. The guideline was revised after a wide consultation with national experts of Kala-azar, district program managers, academic institutions, WHO, communication experts, and members of the civil society. I hope the guideline assists program managers and health workers to practice recommended approaches and ensure uniformity of the program.

Finally, I would like to thank the members of the core team and my colleagues who have been actively involved during the revision and finalization of the guideline, and to WHO for providing support in bringing this guideline to this shape.

**Dr. Babu Ram Marasini**

Director  
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# Table of Contents

<b>Chapters</b>	<b>Page</b>
Introduction	1
Diagnosis	5
Treatment	8
Disease Surveillance	19
Vector Bionomics and Vector Surveillance	22
Integrated Vector Management	24
Behavioral Change Communication	33
Supervision and Monitoring	39
Recording and Reporting	41
Partnership and Collaboration	43
<b>Annexes</b>	45-59
Annex 1: Kala-azar diagnosis	45
Annex 2: SoPs for different ACD methods	48
Annex 3: Indoor residual spraying	53
Annex 4: Kala-azar surveillance formats	59

## Abbreviations and Acronyms

ART	Antiretroviral therapy
BCC	Behavioral change communication
BPKIHS	Bisheswor Prasad Koirala Institute of Health Sciences
CBC	Complete blood count
COMBI	Communication for behaviour impact
ECG	Electrocardiogram
FCHV	Female community health volunteers
HIV	Human immunodeficiency virus
HP	Health post
IEC	Information, education and communication
IM	Intra-muscular
IRS	Indoor residual spraying
IVM	Integrated vector management
KA	Kala-azar
LFT	Liver function tests
LMP	Last menstrual period
PHC	Primary health care
PHCC	Primary health care center
PKDL	Post Kala-azar dermal Leishmaniasis
MCHW	Maternal and child health worker
MWRA	Married women of reproductive age
NGO	Non-governmental organization
OPD	Outpatient department
ORS	Oral rehydration solution
PCR	Polymerase chain reactions
RDT	Rapid diagnostic test
RFT	Renal function tests
RHD	Regional Health Directorate
RTAG	Regional Technical Advisory Group
SEAR	WHO South East Asia Region
SHP	Sub health post
TB	Tuberculosis
TLC	Total leucocyte count
VDC	Village development committee
VHW	Village health worker
VL	Visceral Leishmaniasis
WHOPES	WHO pesticide evaluation scheme

## **Introduction**

### **1.1 Background**

Visceral leishmaniasis (VL) or Kala-azar is a vector-borne disease caused in the Indian sub-continent by the protozoan parasite *Leishmania donovani* and transmitted by the sandfly, *Phlebotomus argentipes*. The disease is characterized by prolonged fever, splenomegaly, anemia, progressive weight loss and sometimes darkening of the skin. In the endemic areas, children and young adults are its principal victims. The disease is fatal if not treated and sometimes even when treated if it is not done timely.

Government of Nepal is committed to the regional strategy to eliminate Kala-azar and along with India and Bangladesh is signatory of the memorandum of understanding that was formalized during the World Health Assembly held in May 2005 on Kala-azar elimination, with the target of achieving elimination by 2015.

In 2005, Epidemiology and Disease Control Division, Department of Health Services formulated a National Plan for the Elimination of Kala-azar. The plan is divided into three phases: Preparatory Phase: 2005-2008; Attack Phase: 2008-2015 and Consolidation Phase: 2015 onwards. The overall goal of the plan is “To contribute to improving the health status of vulnerable groups and at risk populations living in Kala-azar endemic areas of Nepal through the elimination of Kala-azar so that it no longer remains a public health problem”. The target is: “To reduce the annual incidence of Kala-azar to less than 1 per 10,000 populations at the district level by 2015”.

Kala-azar elimination is considered to be possible in the Indian Sub-continent because: 1) human beings are the only reservoir; 2) *P. argentipes* is the only vector; 3) vector is sensitive to DDT and other synthetic pyrethroids; 4) elimination strategy is in place; 5) rK39 rapid diagnostic test is available for the diagnosis; and 6) new efficacious drugs and short regimens are available.

There have been some significant advances both in the diagnosis and treatment of Kala-azar. The rK39 dipstick test kit, a rapid and easily applicable serological test has been demonstrated to have high sensitivity and specificity in validity studies conducted in the Indian subcontinent (Chappuis et al., 2006; Cunningham et al., 2013). An oral drug, miltefosine, has been used for the treatment of Kala-azar for the last few years, but increasing relapses have been recently reported (Rijal, 2013). Other short, safe and efficacious drug regimens have now been demonstrated including single dose liposomal amphotericin B (L-AmB), combination regimens of L-AmB, paromomycin and miltefosine.

The rK39 test kit has been shown to be accurate and recommended as a diagnostic test in the Indian subcontinent. The WHO Expert Committee on Leishmaniasis has recommended liposomal amphotericin B as 1<sup>st</sup> choice for the treatment of Kala-azar and combination regimens as 2<sup>nd</sup> choice during the attack phase. The regional technical working group also recommended the change of monotherapy of miltefosine to L-AmB and combination regimens.

### **1.2 Epidemiology of Leishmaniasis and Problem Situation**

There are three main forms of leishmaniasis – visceral (also known as Kala-azar and the most serious form of the disease), cutaneous (the most common), and mucocutaneous. The disease is caused by the protozoan *Leishmania* parasites which are transmitted by the bite of infected sandflies; and affects the poorest and most marginalized people and is commonly associated with malnutrition, poor housing and a weak immune system.

Globally, 1.3 million new cases and 20 000 to 30 000 deaths due to all three forms of leishmaniasis are estimated to occur annually.

Every year, about 200,000 - 400,000 new cases of visceral leishmaniasis or Kala-azar occur worldwide and over 90% of these new cases occur in six African and Asian countries, namely Bangladesh, Brazil, Ethiopia, India, South Sudan and Sudan. Kala-azar especially occurs among the poorest and socially marginalized communities. In the SEAR countries, Kala-azar occurs in India, Bangladesh and Nepal. A small focus has also been reported from Bhutan. In the three countries of the region about 189 million people in 109 districts are at risk.

Kala-azar or visceral leishmaniasis (VL) is a major public health problem in Nepal. Twelve districts in the eastern and central Terai regions bordering the northern state of Bihar, India are endemic for Kala-azar; however, in recent years cases have been reported from other parts of the country including hilly and Kathmandu valley districts. Over 8.5 million people living in these endemic districts are at risk of Kala-azar. From 1980, the highest numbers of Kala-azar cases were reported in 2003 and since then the cases are in decreasing trend. In 2013, only 325 cases were reported.

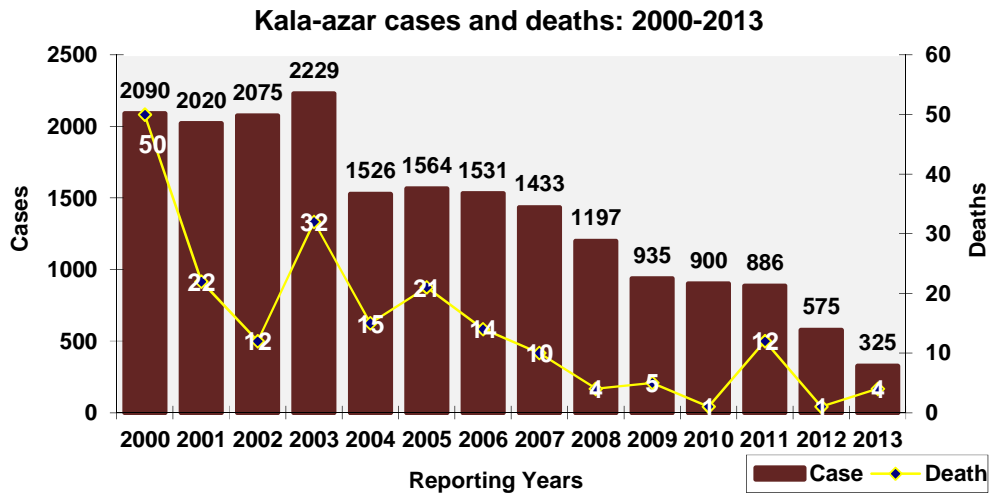


Figure 1: Trend of KA cases and deaths

Since Kala-azar in Nepal is a disease of poverty affecting people from the lowest socio-economic strata and living in rural areas access to health care services is a major challenge. Households with damp earthen floors are ideal breeding sites for sandflies; poor families will be more affected by malnutrition thus more vulnerable to the disease and will be less likely to seek for health care in a timely manner if sick.

### Changing Epidemiology of Kala-azar

Lately also, Kala-azar cases are being reported from hill, Kathmandu valley and some mountain districts. In 2013, almost 14 percent (45 out of 325 cases) of all reported cases were from 22 non-program districts, some of which are in immediate geographical proximity to endemic districts. This shift in occurrence of cases in non program districts has prompted to verify the existence of vector and other evidences.

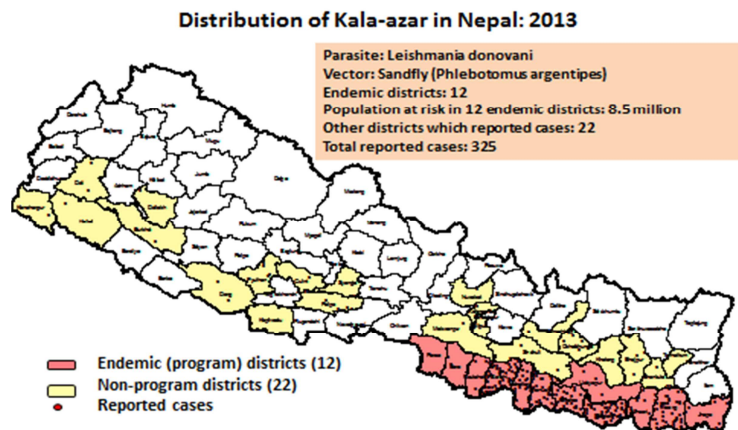


Figure 2: Spatial distribution of Kala-azar cases, 2013

### **1.3 Goal and Elimination Target**

The ultimate goal of Kala-azar elimination program is to contribute to mitigation of poverty in the 12 Kala-azar endemic districts of Nepal by reducing the morbidity and mortality of the disease and assisting in the development of equitable health systems.

#### **Target**

By the end of 2015, the annual incidence of Kala-azar will be reduced to less than 1 case per 10,000 populations at district level and the disease specific case fatality rate will be reduced to less than 1 percent.

### **1.4 Objectives**

The **overall objectives** are to:

- Reduce incidence of Kala-aza in endemic communities with special emphasis on poor, vulnerable and unreached populations.
- Reduce case fatality rates from Kala-azar;
- Treat Post Kala-azar Dermal Leishmaniasis (PKDL) to reduce the parasite reservoir;
- Prevent and treat Kala-azar - HIV-TB co-infections.

### **1.5 Strategies**

Based on the regional strategy proposed by South East Asia Kala-azar Technical Advisory Group (RTAG) and the adjustments proposed by the Nepal expert group discussions, Government of Nepal, Ministry of Health and Population has adopted the following strategies in the implementation of the Kala-azar elimination program in Nepal:

- Improve program management.
- Early diagnosis and complete treatment (introducing new technology)
- Integrated vector management
- Effective disease and vector surveillance
- Social mobilization and partnerships
- Clinical, implementation and operational research

### **1.6 Classification of Health Institutions**

Health institutions are classified into three different levels for the Kala-azar elimination program activities. This classification is based on the needs, severity and staffing, expected job description and the diagnostic and treatment facilities available.

For the success of the elimination program, it is also important to develop linkages among all levels of health institutions including the ongoing communication with the private sector. The district program focal person will be responsible for sustaining the linkages.

**Table 1: Classification of different levels of health facilities in Nepal**

<b>Level I</b>	<b>Level II</b>	<b>Level III</b>
<p><b><u>Public Sector</u></b></p> <ul style="list-style-type: none"> <li>• Health post</li> <li>• Sub-Health post</li> <li>• Female Community health volunteers (FCHV)</li> </ul>	<p><b><u>Public Sector</u></b></p> <ul style="list-style-type: none"> <li>• Primary Health Care Centers (PHCC)</li> </ul>	<ul style="list-style-type: none"> <li>• District hospitals</li> <li>• Zonal and regional hospitals</li> <li>• Medical College</li> <li>• National hospitals</li> </ul>
<p><b><u>Private Sector</u></b></p> <ul style="list-style-type: none"> <li>• Unqualified practitioners</li> <li>• Qualified practitioners</li> <li>• Medicine shops</li> </ul>	<p><b><u>Private Sector</u></b></p> <ul style="list-style-type: none"> <li>• Nursing homes</li> <li>• Private laboratories</li> <li>• NGOs</li> </ul>	<p><b><u>Private Sector</u></b></p> <ul style="list-style-type: none"> <li>• Large hospitals</li> <li>• Medical colleges</li> </ul>

**Note:** (i) BP Koirala Institute of Health Science, Dharan and (ii) Sukraraj Tropical and Infectious Diseases Hospital, Teku, Kathmandu are identified as national referral centers.

## 1.7 Key Indicators for Monitoring the KA Elimination Programme

The following indicators will be used to monitor the progress towards KA elimination in the country:

### 1. Kala-azar incidence per 10,000 population:

$$\frac{\text{Number of new cases of Kala-azar per year in the district} \times 10,000}{\text{Total population at risk in the district}}$$

### 2. Case fatality rate of Kala-azar (%):

$$\frac{\text{Number of deaths due to Kala-azar} \times 100}{\text{Total number of Kala-azar cases}}$$

### 3. Case detection rate (%):

$$\frac{\text{Number of new cases of KA detected per year in the district} \times 100}{\text{Total population in the same area}}$$

### 4. Treatment completion rate (%):

$$\frac{\text{Number of patients that took a full course of the first line drugs} \times 100}{\text{All new KA cases that started treatment in a given period}}$$

### 5. Coverage rate of vector control (%):

$$\frac{\text{Number of households protected} \times 100}{\text{All households at risk}}$$

## Diagnosis of Kala-azar

### 2.1 Case Definitions

- **Suspected case of Kala-azar (KA):** Person from a Kala-azar endemic area with a history of fever for  $\geq 2$  weeks along with a palpable spleen and who does not respond to a full course of appropriate anti-malarial drugs.
- **A case of Kala-azar:** A person from an endemic area with fever of more than two weeks duration and with splenomegaly, who is confirmed by an RDT or a biopsy.
- **Probable post Kala-azar dermal leishmaniasis (PKDL):** A patient with papules, nodules, plaques, macular hypopigmentation and lived in or travelled to Kala-azar endemic area and/or past history of Kala-azar treatment and rK39 positive.
- **Confirmed PKDL:** A patient from a Kala-azar endemic area with multiple hypopigmented macules, papules, plaques or nodules, who is parasite positive in slit-skin smear (SSS) or biopsy.

### 2.2 Laboratory Investigations and Diagnostic Tests

The following laboratory investigations and diagnostic tests will be done for diagnosis of Kala-azar and PKDL and monitoring the progress and side effects of the drugs during the course of treatment:

#### 2.2.1 Rapid dipstick test (rK39 test)

rK39 is a 39-amino acid repeat that is part of a kinesin related protein in *Leishmania chagasi* and which is conserved within the *Leishmania donovani* complex. Among the available serological diagnosis of VL, only the immunochromatographic rK39 assay can be considered a point of care test for field application. On the Indian subcontinent these rK39 RDTs from different companies performed well, with high sensitivity ranging from 92.8% to 100% and high specificity ranging from 99.2% to 100% (Chappuius et al., 2006; Cunningham et al. 2012). rK39 dipstick tests are easy to perform, rapid (10-20 minutes), cheap and give reproducible results. They are currently the best available diagnostic tool for VL for use in remote areas, and their use in field setting should be promoted. Apart from use in routine services, use of rK39 in campaigns and active case search is highly recommended.

This test may be positive in a healthy person from the endemic areas (asymptomatic cases, past infection). Such case should be followed up and treated only when they have indicative signs and symptoms of Kala-azar. rK39 is usually negative amongst PKDL with macular lesions and

#### Leishmaniasis

There are mainly three types or forms of leishmaniasis:

1. **Visceral leishmaniasis (VL)** is also known as **Kala-azar** in Indian subcontinent and is fatal if not treated. It is highly endemic in the Indian subcontinent and in East Africa and is characterized by:
  - fever-moderate, irregular,
  - progressive weight loss,
  - enlargement of spleen and liver,
  - anaemia,
  - changes in skin colour, (and hence it is called Kala-azar)
2. **Cutaneous leishmaniasis (CL)** is the most common form of leishmaniasis and causes ulcers on exposed parts of the body, leaving life-long scars and serious disability. About 95% of CL cases occur in the Americas, the Mediterranean basin, and the Middle East and Central Asia. An estimated 0.7 million to 1.3 million new cases occur worldwide annually.
3. **Mucocutaneous leishmaniasis:** causes partial or total destruction of mucous membranes of the nose, mouth and throat. Almost 90% of mucocutaneous leishmaniasis occurs in Bolivia, Brazil and Peru.

In Nepal, cutaneous and mucocutaneous forms have not been reported or well documented.

HIV/Kala-azar co-infection. Such cases should be confirmed using the PCR test, pinch biopsy, parasitological test whichever is appropriate and available.

rK39 is available at Kala-azar endemic districts from level II and above health institutions. These health facilities also receive supplies of the drugs used for the treatment of Kala-azar. Lab technician perform and report the test. Each batch of the rK39 RDT should be checked for its performance in the referral level hospitals to assure the quality (See annex-1).

### 2.2.2 Parasitological test

Demonstration of the *Leishmania donovani* (LD) bodies by microscopy was the only specific test available before the rk39 RDT was available. The spleen aspirate is still considered as the gold standard for diagnosis of Kala-azar because of its high sensitivity and specificity. Examination of aspirates from bone marrow is less sensitive compared to spleen aspirate but much safer. The parasitology diagnostic service is available only at level III health institutions and special referral centers. Bone marrow or splenic aspiration should only be performed by a qualified physician/medical officer and where facilities to deal with the complications are available. The parasitology test is not recommended in institutions where the above mentioned criteria do not meet.

Indications for parasitological examinations for diagnosis of Kala-azar are as follows:

- (i) The rK39 test is negative but the suspicion of Kala-azar is high.
- (ii) Patients diagnosed by rK39 who do not respond to the first line drug and patients with suspicion of relapse.
- (iii) Patients with Kala-azar and HIV co-infections when rK39 RDT is negative.
- (iv) In settings where studies are done for monitoring of drug resistance.

### 2.2.3 Other laboratory tests

In order to monitor the side effects of drugs and progress of treatment, the following lab tests would be made available at different levels of health institutions:

**Table 2: List of laboratory tests available at different levels of health institutions of Nepal**

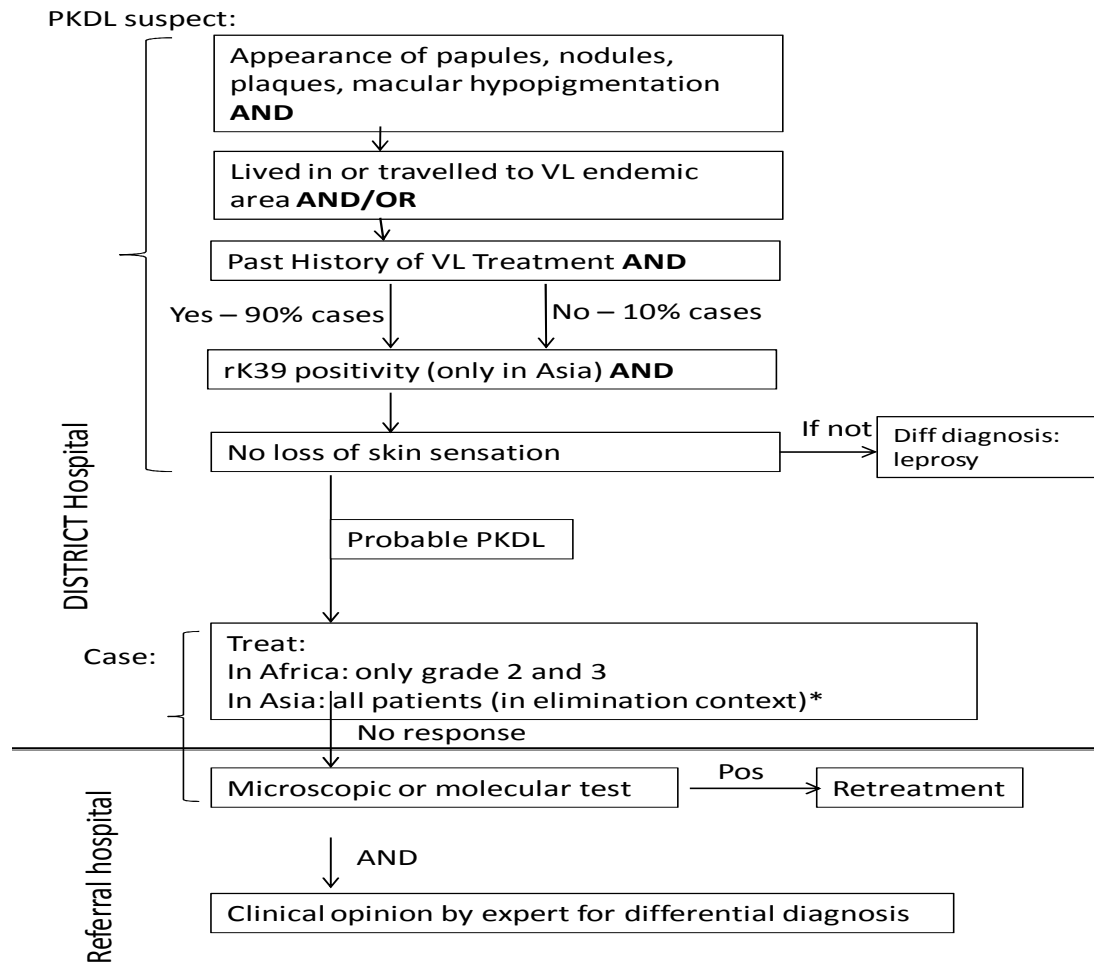
S.N.	Test	Level II	Level III and above
1.	CBC	Hb %, TLC, Platelet count	Hb %, TLC, Platelet count
2.	Prothrombin time	No	Yes
3.	Renal function test	No	Urea, Creatinine
4.	Liver function test	No	Bilirubin, SGPT
5.	Pregnancy test	Yes	Yes
6.	Malaria parasite	Yes	Yes
7.	HIV	No	Yes
8.	Urine dipstick test for protein	Yes	Yes

### 2.2.4 Diagnosis of PKDL

All suspected cases of PKDL should be confirmed with rK39 test. However, it is important to note that the rK39 test may be negative in PKDL cases with only macular lesions and Kala-azar/HIV co-infection. If there is strong suspicion amongst rK39 negative suspected cases in above mentioned conditions, such patients should be referred to centers where diagnostic facility of PCR or demonstration of parasite in pinch biopsy is available. The following algorithm should be followed for PKDL diagnosis:



## Algorithm for PKDL diagnosis



### 2.3 Quality Assurance of rK39 Test Kits

For the quality assurance of laboratory diagnosis of Kala-azar/PKDL using rK39 rapid test kits, the following activities will be performed:

- rK39 procured in each batch will be tested using archive samples at reference laboratory.
- Training of laboratory personals will be conducted.

## **Treatment**

The objective of treatment of Kala-azar is to cure the patient, prevent complications of the disease, minimize the side effects of medicines, contain the risk of development of drug resistance and reduce the risk of disease spread. To ensure drug compliance and monitoring of cases under treatment, preparation of the cases is critical. Novel therapies such as Liposomal Amphotericin B (L-AmB) including single dose regimen and combination regimens are important breakthrough for Kala-azar in the Indian subcontinent and have been recommended as the treatments of choice in this region.

There are limited drugs available for the treatment of Kala-azar and there is a need to preserve them.

Miltefosine, currently being deployed in the VL elimination initiative has shown several drawbacks: decreased efficacy, lack of compliance and a number of serious adverse events have been observed. It is also contra-indicated in pregnancy and in women of childbearing age unless they use contraception. Also the current capacity of the health facilities has not been able to ensure a directly observed treatment for such long regimens. Moreover recent findings of a research study from Nepal showed up to 20% relapse at 12 months after treatment.

WHO Expert Committee on Leishmaniasis in 2010 and Regional Technical Advisory Group (RTAG) for the Kala-azar elimination programme meeting in 2011 recommended Liposomal Amphotericin B (L-AmB) as the first line regimen, during the attack phase, for the Indian subcontinent (ISC). Taking into consideration its high efficacy, safety, ease of use and assured compliance; results of a phase 3 trial evaluating three regimens for combination therapy: Liposomal Amphotericin B/Paromomycin; Liposomal Amphotericin B/Miltefosine; Paromomycin/Miltefosine showed excellent efficacy and safety of all 3 regimens. The combination regimens have been recommended as a second line regimen for the ISC in the attack phase. In the long term combination regimens are the best way to protect individual drugs from developing resistance. Monotherapy with miltefosine or paromomycin is a fourth choice (after Amphotericin B) in the recommendation of the expert committee.

L-AmB needs a cold chain (<25° Celsius) for storage; therefore, L-AmB should be made available only in hospitals where proper storage can be ensured. Their use in the programme will be initiated in 2-3 hospitals and then gradually expanded.

Miltefosine monotherapy will be gradually phased out in the programme. This is to be replaced by Liposomal Amphotericin B monotherapy and combination treatment regimens. The therapy should be directly observed and the patient needs to be hospitalized for the full duration of the therapy.

### **Choice of treatment**

The national program recommends the use of the following drugs for Kala-azar treatment:

**First line therapy-** Liposomal amphotericin B infusion (15 mg/Kg in 3 doses or single dose of 10 mg/Kg).

OR

Combination therapy regimens (i) Miltefosine (D1-10) + Paromomycin (D1-10) and (ii) L-AmB (5mg/Kg on D1) + Paromomycin (D2-D11).

In children (< 5 years), pregnant and breast feeding women and women of child bearing age group, the preferred regimens will be L-AmB or combination of L-AmB + Paromomycin.

**Second line therapy-** Miltefosine 50mg twice daily for 28 days for adults (> 11 years and more than 25 Kg body weight)); 50mg daily for 28 days for adults (> 11 years and less than 25 Kg body weight); children (2-11 years age) -2.5 mg/kg body weight 10 mg formulation in divided doses for 28 days.

OR

Amphotericin B at a dose of 0.75-1 mg/kg daily dose as a daily IV infusion in 5% dextrose over 4 hours for 14 days. If there is poor response to the treatment, the drug has to be continued for a period of 21-28 days.

Pharmacovigilance data on the safety of the above regimens should be systematically collected from the reference health facilities.

### 3.1 Liposomal Amphotericin B

Out of the 3 lipid formulations of amphotericin B, Liposomal amphotericin B (L-AmB) has demonstrated superior safety profile. It has much less side effects and similar efficacy when compared to conventional amphotericin B. The treatment duration is the shortest amongst all drugs currently used for the treatment of Kala-azar and ensures high drug compliance amongst the users. L-AmB is safe and effective for pregnant and lactating women, children and is well tolerated by all types of patients. Documented cure rate is more than 95% when given intravenously in a dose of 3mg/Kg for five days or 5 mg/Kg for three days. Studies have also shown that a single dose of 10 mg/Kg given IV has a cure rate of more than 90%.

#### Preparation and mode of administration of liposomal amphotericin B

L-AmB comes in a lyophilized powder form which should be reconstituted in 12 ml of sterile water for injection to each vial (to yield a preparation containing 4 mg amphotericin B per ml). The drug is given by infusion in 5% dextrose using a volume of at least 100 ml per vial. It should not be mixed with saline or other electrolyte solutions. Transfusion from the reconstituted vial into the infusion bag is done through a 5 micron filter provided to remove any particular matter. Once reconstituted the vials are stored at 2-8 degrees Celsius and to be used within 24 hours. The drug is given in slow intravenous infusion over a period of two hours. Before infusion each patient should be given Tab. Paracetamol (adult: 500 mg; children below 12 years 10 mg/kg) and Tab. Chlorpheniramine (adult: 4mg; children below 12 years 1-2mg). A test infusion of 1 mg is administered to the patient for about 10 minutes, after which the patient is observed carefully during half an hour. If no severe allergic reaction has occurred the infusion can be continued.

**Table 3: Recommended doses of L-AmB according to body weight**

Drug category	Day 1	Day 2	Day 3	Duration
15mg/Kg body weight	5mg/Kg body weight	5mg/Kg body weight	5mg/Kg body weight	3 days
10mg/Kg body weight	Single dose			1 time

#### Things to be remembered

- Immediately after addition of water, shake the vial for 30 seconds.
- Do not reconstitute with saline or add saline to the reconstituted concentration, or mix with other drugs.**
- L-AmB is administered intravenously, and therefore requires trained staff, who can ensure the drug is administered properly.
- A cold chain with a narrow temperature range (<25°C) is required for L-AmB storage and it should not be frozen.
- It should be protected from exposure to light.

- f) The reconstituted L-AmB may be stored for maximum of-24 hours at 2-8°C before use.
- g) Patients presenting with severe dehydration should be re-hydrated before starting the treatment.
- h) High-dose monotherapy in HIV-positive VL patients may have poor outcomes.

### Side effects and its management

Some reported side effects of L-AmB include infusion related fever and rigor, chills, nausea/vomiting, headache, backache, chest pain, hypokalemia, dyspnoea, bronchospasm, tachycardia, hypotension, nephrotoxicity, and hepatobiliary disorders.

### Management

- a) Usually the drug may produce nausea/vomiting which are generally mild, of short duration and reversible. If vomiting is severe and does not stop, the patient should be referred to level III health institution for further treatment.
- b) If severe side effects are reported, the patient should be referred to level III health institution for further investigation and treatment.
- c) If fever is reported during follow up, then the patient may have other infections along with Kala-azar. Such patients should be referred to level III health institution for further investigation and treatment.
- d) Hypokalaemia may occur in some patients and should be corrected using potassium chloride.

### Indications for stopping L-AmB treatment

Patients who develop hypersensitivity reactions require cessation of L-AmB and switching to an alternative treatment. If a severe anaphylactic reaction occurs, the infusion should be immediately discontinued and the patient should not receive any further infusions.

## 3.2 Miltefosine

Miltefosine is used in the treatment of confirmed Kala-azar cases if there are no contraindications and is the only available oral anti Kala-azar drug. It is available in two doses: as 10mg and 50mg capsule. It is a relatively safe drug; however, relapse of miltefosine treated Kala-azar cases has been reported in studies in Nepal, India and Bangladesh.

**Table 4: Contraindications of miltefosine and methods of verification**

Contraindication	Method of verification
Pregnancy	History of LMP and Pregnancy test
MWRA not using contraceptives	History
Lactating mother	History
Less than 2 years	History
Severe illness, bed bound	History and Physical examination
Malnutrition	< 10 percentile weight for age
Severe anemia (Hb% < 5 gm)	Level of Hb
Patients with known kidney disease	Edema, decreased urine output, Protenuria
Patients with known liver disease	Jaundice
Chronic alcoholism	History

**Table 5: Recommended doses of miltefosine according to body weight**

Drug category	Morning	Evening	Duration
Adults (> 11 years and more than 25 Kg body weight)	50mg	50mg	28 days
Adults (> 11 years and less than 25 Kg body weight)	50 mg	0	28 days
Children (2-11 years age) (2.5mg/kg body weight 10mg formulation in divided doses)			28 days

**Note:**

- a) The drug should not be taken on an empty stomach, i.e. should be taken after meals.
- b) In case of any missed doses, the 28-day course can be completed by 35 days without exceeding the maximum recommended daily dose.

**Things to be remembered during treatment**

- a) The Kala-azar patient should be admitted at the health institution while starting treatment.
- b) Make sure that the patient does not have liver or kidney disease, i.e. clinically no jaundice and no edema.
- c) Search and exclude any other contraindications.
- d) Treat the case of severe anemia and malnutrition.
- e) Give adequate ORS if the patient is dehydrated.
- f) Married women of reproductive age should use contraception for at least three months after starting treatment with miltefosine. The method of choice is injection Depo provera, administered IM route on the fourth day of next menstrual cycle. Until then they should be advised to use barrier methods.
- g) Provide “observed therapy” of every dose supervised by a health worker of the nearest health institution, local FCHV or responsible family member.
- h) Supervise health workers/FCHVs of nearest health institution to fill and update the treatment card daily.
- i) Monitor the patient daily for the possible side effects with information from the health worker of the nearest health institution, local FCHV or responsible family member.

**Table 6: Recommended laboratory tests that are to perform for baseline and monitoring purposes**

Test	Frequency	Timing	Indication
Hematology: Hb %, WCC	2	- Baseline, - End of therapy	- Exclude contra-indications - Monitoring of clinical response
Pregnancy test	1	- Pre treatment	- Women of child bearing age
Urine for albumin (dipstick)	2	- Pre treatment, - End of 1st week	- To exclude contraindications - To monitor for complication

**Note:** Frequency of the tests and additional tests can also be recommended as per the discretion of the treating physician.

**Side effects and its management**

- a) The common side effects of miltefosine are vomiting, diarrhea and abdominal pain. Rarely, there may be liver or kidney related side effects.
- b) Usually the drug may produce vomiting and diarrhea during the first week of treatment in some patients. The symptoms are generally mild, of short duration and reversible.
- c) Patients having diarrhea should be advised to take oral re-hydration solution frequently and they should be reassured that the diarrhea and vomiting will stop after a few days.

- d) If vomiting is severe and does not stop, the patient should be referred to level III health institution for further treatment.
- e) Puffiness of face, jaundice, or decreased urine output may be liver or kidney related side effects. The patients, family members, FCHVs should be advised to monitor these symptoms. If these symptoms are reported, the patient should be referred to level III health institution for further investigation and treatment.
- f) If fever persists in spite of taking miltefosine for two weeks, then the patient may have other infections along with Kala-azar. Such patients should be referred to level III health institution for further investigation and treatment.

### **Indications for stopping miltefosine treatment**

If any of the following conditions is observed, stop the miltefosine and immediately refer the patient to level III health institution.

- Pregnancy during the treatment
- Development of any of the following signs and symptoms:
  - o Jaundice
  - o Puffiness of face
  - o Decreased urine output
  - o Breathlessness
  - o Severe vomiting
  - o Severe diarrhea

### **3.3 Amphotericin B**

Amphotericin B is excellent drug for the treatment of Kala-azar. The cure rate of this drug is very high, exceeding 90%. The patient must be admitted at level III health institution or special referral centers for administering Amphotericin B as it requires monitoring of renal parameters. The drug is given at 0.75-1 mg/kg daily as IV infusion in 5% dextrose over 4 hours for 14 days. If there is poor response to the treatment, the drug has to be continued for a period of 21-28 days.

The side effects of Amphotericin B include fever with chills and rigors. Injection avil, paracetamol tablet and hydrocortisone injection should be ready at the health institution for the treatment of these side effects. Besides these, hypokalaemia, nephropathy and myocarditis are major side effects of the drug. Regular monitoring of any side effects is therefore extremely important during the treatment with the second line drug. The health institutions where this drug is given should be well equipped to do the tests and be able to do the monitoring of the patient round the clock.

Patients with Kala-azar are sometimes severely anemic. The hemoglobin level has to be brought up to at least 5 gm/dl before initiating the treatment with Amphotericin B. Blood creatinine and renal function tests, monitoring for myocarditis and electrolytes are also necessary and this is possible only in specialized referral centers.

Amphotericin B is generally recommended in the following conditions:

- Contra-indications for miltefosine- pregnancy, absolutely breast feeding mother, children less than two years of age, and the Kala-azar patients associated with liver or kidney diseases.
- Kala-azar treatment failure i.e. unresponsive to miltefosine or in cases of relapse.
- Kala-azar patients whose first line therapy is discontinued due to severe side effects.
- Kala-azar cases with past history of Kala-azar treatment.

### 3.4 Combination Therapy for Kala-azar

Combination therapy is the use of existing drugs in combination, each in lower doses. The combination therapy helps to decrease the incidence of severe side effects and drug toxicity, as well as the risk for development of resistance against the drugs. The combination therapy delays the development of resistance by the parasite since the drugs in combination have different mode of action and the parasite will not be able to develop resistance mechanism for both the drugs in combination.

Combination therapy regimens are 1<sup>st</sup> line therapy for the treatment of Kala-azar.

- (i) Miltefosine (Day 1-Day 10) + Paromomycin (Day 1-Day 10)
- (ii) L-AmB (5mg/Kg on Day 1) + Paromomycin (Day 2-Day 11)

The first combination therapy is for those who do not have contraindications for miltefosine. If contraindication to miltefosine, the second combination therapy should be given.

### 3.5 Paromomycin

Paromomycin is an aminoglycoside antibiotic and promising new effective drug for the treatment of Kala-azar. The recommended dose is 15 mg/kg/day to be given by intramuscular (IM) injections for 21 days. Paromomycin is absorbed quickly after intramuscular injection, reaching peak plasma levels within 1 hour. The medicine is safe with minimal ototoxicity or nephrotoxicity. In the recommended dose, the ototoxicity is reversible. Pain in injection site is common. Paromomycin can be administered intramuscularly according to body weight to patients with visceral leishmaniasis who have normal renal function including children without the need for therapeutic monitoring or dose adjustment. The drug is particularly useful for child bearing age women and children since safety and efficacy are not affected by gender and age. Monitoring of aspartate aminotransferase or alanine aminotransferase levels, or both, in a program to control visceral leishmaniasis will be an important for patients with pre-existing liver disease.

In pregnant women, paromomycin crosses the placenta and can cause renal and auditory damage in the fetus. Paromomycin is excreted in breast milk and adverse effects in the breast fed infant cannot be excluded.

#### Things to be remembered for treatment

- a) Paromomycin is administered intramuscularly (IM).
- b) Do not use during pregnancy.
- c) Paromomycin should be avoided in patients with severe anaemia with hemoglobin <5 g/dl.
- d) Do not use in patients with hypersensitivity to paromomycin or to other aminoglycoside antibiotics. Discontinue use if an allergic reaction occurs. Paromomycin is contraindicated in patients with renal insufficiency.
- e) In cases where paromomycin or the combination therapy using paromomycin do not lead to a VL cure at or before 6 months, do not repeat therapy. Instead, switch to another anti-leishmanial drug.
- f) The medicine may have minimal ototoxicity or nephrotoxicity. Other factors that may increase patient risk of toxicity are dehydration and advanced age.
- g) It should be stored below 30°C but do not freeze. It should also be protected from light.

#### Side effects and its management

The most commonly reported adverse drug reactions are injection site pain, increase in liver enzymes aspartate aminotransferase (AST) and alanine aminotransferase (ALT), pyrexia, abnormal audiogram, and vomiting. These effects are usually mild to moderate and transient or reversible at the end of treatment.

## **Indications for stopping paromomycin treatment**

The drug should be discontinued if an allergic reaction occurs.

## **3.5 Complete Treatment**

Cure from Kala-azar can be achieved only after completion of treatment regimen. The following measures are recommended to complete the treatment:

### **A. Counseling**

After confirming the diagnosis of Kala-azar the following needs to be explained to the patient and family:

- Explain the importance of the need to treat Kala-azar, and inform that it can kill an individual if treatment is not started.
- Inform that the drug is provided free of cost.
- Explain the need to complete the full course of the treatment.
- Explain the need to start and continue treatment under supervision/observation.
- Inform that the patient will begin to start feeling better after a few days of treatment but this does not mean cure. The symptoms will reappear if the treatment is not taken as advised and cure would occur only when full treatment has been taken.
- Explain the side effects of the treatment and advised them to contact the health worker if such events occur.

### **B. Treatment under supervision/observation**

The patient to be treated with miltefosine monotherapy needs to be admitted initially for a period of 2-3 days to supervise treatment and other necessary observations. Then a 7-day course of medicine will be provided to the case with an advice of follow up visit for assessment and re-supply. The side effects of the medicine are seen mostly during the first week of treatment, and are the basis of the recommendation. The oral treatment should be given under direct supervision of health care provider. It increases the probability of the case completing the treatment and reporting the health facility staff of any side effects, if they occur. The health facility staff will be responsible to treat moderate type of side effects such as diarrhea and vomiting. If the problem does not get better, the patient should be referred to level II or III health institution.

Treatment with Liposomal Amphotericin B, Amphotericin B or combination regimens requires hospitalization for the full duration of the treatment.

### **C. Recording and following up of patients**

- Each patient should have a separate treatment box that contains the full treatment record.
- The treatment box should have the name including other details of identification of the patient.
- A separate treatment card should be provided to each new case and the card should have patient specific identification number. The card records the number of days the treatment has been taken by the patient.

### **D. Treatment outcomes in Kala-azar**

Treatment outcomes in KA have to be assessed twice:

- (i) at the last day of drug treatment (initial outcome) and
- (ii) six months after the last drug was taken (final outcome).



1. **Cure:** a patient is considered clinically cured if he/she has completed full treatment and there are no signs and symptoms of KA
2. **Non-response:** signs and symptoms persist or recur despite satisfactory treatment for more than two weeks
3. **Relapse:** any reappearance of KA signs and symptoms within a period of six months after the end of treatment.
4. **Treatment failure:** non-response or relapse.

There are more possible outcomes at each time point of treatment which are listed below.

*At initial assessment, at the last day of drug treatment*

- **Initial cure:** a full course of drugs has been completed AND the patient has clinically improved. Clinical criteria for cure should be assessed as no fever + regression of enlarged spleen + return of appetite and/or gain in body weight.
- **Non-response:** signs and symptoms persist or recur. Switch to a second-line drug because of no response to the first-line drug.
- **Side-effects related switch:** side-effects necessitate a change of treatment.
- **Death:** any death, whether or not related to KA.
- **Default:** the patient does not complete treatment and/or does not present for assessment after treatment.

*At final assessment, six months after the last drug taken*

- **Final cure:** an initial cure patient who is symptom-free at six months after the end of treatment.
- **Relapse:** any reappearance of KA symptoms within a period of six months after the end of treatment.
- **Death:** any death, whether or not related to KA.
- **Loss to follow-up:** patient does not present for assessment at six months.

### **Criteria for cure:**

The cure of Kala-azar is confirmed by absence of parasite from splenic and bone marrow smears. Such provision is available in specialized institutions only. However, for program purpose a case completing treatment is considered clinically cured when there are no sign and symptoms of Kala-azar and skin lesion of PKDL are regressed. Complete clinical criteria of cure of Kala-azar are as follows:

1. The full course of treatment has been taken.
2. Fever is absent.
3. Regression of spleen has occurred.
4. Return of normal appetite is reported.
5. Increase in body weight has been reported.
6. Improvement in anaemia and a rise in hemoglobin have been demonstrated.

### 3.6 Treatment of Kala-azar in Special Situations

Following conditions are considered as special situations for Kala-azar, and the national program recommends treatment of such cases at level III health institution or special referral centers.

- (i) Pregnancy
- (ii) Married women of reproductive age who are not using contraceptives regularly
- (iii) Absolutely breast feeding mother
- (iv) Children less than two year of age
- (v) Kala-azar and severe anemia (hemoglobin less than 5 mg/dl)
- (vi) Kala-azar and TB co-infections
- (vii) Kala-azar with HIV co-infections
- (viii) Kala-azar patient suffering from any other serious disease(s).

The treatment of choice in these situations is L-AmB.

#### **Note:**

- All level II health institutions are not equipped to diagnose HIV. So every Kala-azar cases with high risk behavior for HIV/STDs should be referred to a health facility where HIV testing and counseling services are available and all HIV positive cases should be referred to health facilities where ART services are available. It is important to note that rK39 test has lower sensitivity in HIV positive or AIDS cases; and parasitological diagnosis is required to confirm Kala-azar infection among all rK39 negative cases.
- The treatment and care of KA patients with HIV or TB co-infection is advised in the special referral centres.

### 3.7 Treatment of PKDL

Cases of PKDL usually do not have any signs of Kala-azar like fever, splenomegaly, or anemia. Although 85-90% of them appear after the cure of Kala-azar, it is important to note that 15% of cases of PKDL occur without the preceding history. They present with skin lesions that may be macular, popular, nodular, or mixed. In PKDL cases sensation over the lesions is preserved in contrast to leprosy where similar lesions loose sensations. Sometimes the lesions of PKDL are extensive. Following complete treatment of PKDL case, all skin lesions disappear.

The PKDL patients are stigmatized and therefore may be unwilling to participate in the treatment. The patients do not have any other problem other than the skin lesions and it is very difficult to convince them to take long course of treatment. If PKDL cases are not identified or receive incomplete treatment they remain as a reservoir of Kala-azar and contribute to continued transmission at community level, so counseling of PKDL cases is very important for completing treatment.

It is advised to refer all the PKDL cases to level III health institution or special referral center for treatment. The following recommendations are considered for the treatment of PKDL:

The recommended treatments of PKDL are Liposomal Amphotericin B (treatment dose and duration under study), Miltefosine (orally, for 12 weeks at daily doses of 100 mg for patients weighing  $\geq 25$  kg and 50 mg for those  $<25$  kg.), and Amphotericin B (1mg/kg, 5-6 courses at an interval of 10 days in between the courses).

**Table 7: Dose and treatment schedule for PKDL**

Drug	Dose	Schedule
Miltefosine*	Daily doses of 100 mg for patients weighing > 25 kg and 50 mg for those <25 kg.	Daily for 12 weeks
Liposomal Amphotericin B**	Twice weekly 5 mg/kg IV infusion for 3 weeks (up to total dose of 30mg/kg)	Twice weekly for 3 weeks
Amphotericin B	1 mg/kg IV infusion	60–80 doses over 4-5 months with (20 doses on followed by 20 days interval)

\* As the safety of courses of Miltefosine longer than 4 weeks has not been evaluated, all patients should be closely monitored for any unexpected side effects. (All patients should be admitted for first 4-7 days).

\*\*As Liposomal Amphotericin B can cause hypokalemia, provide daily oral potassium supplementation.

### Treatment outcomes in PKDL

Treatment outcomes in PKDL should be clinically assessed at district hospital. A significant improvement can mean, for example, at least 80% resolution in the number of macules and/or a decrease in erythema and flattening of lesions.

**Initial cure:** clinical improvement at the end of treatment – defined as a considerable reduction in the number and size of skin lesions.

**Final cure:** clinical cure 12 months after the end of treatment – defined as a complete resolution of macules, papules, plaques and nodules.

### 3.8 Pharmaco-vigilance

The drugs recommended for the treatment of Kala-azar or PKDL have some side effects. These may be looked for in the form of signs and symptoms. Laboratory tests like haematological tests, liver function tests, kidney function tests, electrolytes and ECG are recommended to monitor the side effects. Such laboratory tests can help recognize the occurrence of the side effects at early stage. The program should initiate clinical and laboratory monitoring of side effects and this information can be complemented by regular reporting of major and minor side effects by the local health institution.

In order to ensure the safety of the cases under treatment, drugs used require continued monitoring of side effects. This is best performed with joint responsibility of local health institution, sentinel surveillance sites and the national program. Pharmaco-vigilance performed by sentinel sites will provide limited data at a high cost but the quality is likely to be good. The national program can provide very useful information but unless protocols are appropriate and the supervision is strong, the quality of information may be compromised. To start with some of the level III health institutions and all special referral centers will be identified as sentinel sites for this purpose.

The following measures will help with early recognition of the occurrence of adverse events:

- Monitor patient regularly for signs and symptoms indicative of adverse events of drugs. Any signs and symptoms should be classified as major or minor.
- If possible, perform tests in treatment sites and monitor the results. This can facilitate timely measures even before any signs appear.
- Organize periodic meetings to review reports of major and minor adverse events submitted from the different levels. This will help guide the programme in recommending the tests necessary to monitor patients that are on treatment.

- Use reporting forms to report any adverse events to higher levels once a month for review and feedback.

The following recommendations are considered for pharmacovigilance during the course of treatment for Kala-azar and PKDL:

**Table 8: Side effects of different drugs used for the treatment of Kala-azar and laboratory tests recommended to confirm the side effects**

Medicines	Side effects	Laboratory tests
<b>Liposomal Amphotericin B</b>	<ul style="list-style-type: none"> <li>• Infusion related fever and rigor</li> <li>• Chills</li> <li>• Vomiting</li> <li>• Backache</li> </ul>	<ul style="list-style-type: none"> <li>• Electrolytes</li> <li>• RFT</li> </ul>
<b>Paromomycin</b>	<ul style="list-style-type: none"> <li>• Ototoxicity</li> <li>• Nephrotoxicity</li> </ul>	<ul style="list-style-type: none"> <li>• RFT</li> </ul>
<b>Miltefosine</b>	<ul style="list-style-type: none"> <li>• Gastrointestinal effects (vomiting, diarrhea, abdominal pain) (major)</li> <li>• Nephrotoxicity (decreased urine, renal failure) (major)</li> <li>• Hepatotoxicity (jaundice) (major)</li> <li>• Any other, unanticipated (edema, anaemia)</li> </ul>	<ul style="list-style-type: none"> <li>• Electrolytes</li> <li>• LFT, RFT</li> <li>• CBC</li> </ul>
<b>Amphotericin B</b>	<ul style="list-style-type: none"> <li>• Fever with chills and rigors (minor)</li> <li>• Vomiting, dehydration (major)</li> <li>• Edema, decreased urine, renal failure</li> <li>• Arrhythmias (major)</li> </ul>	<ul style="list-style-type: none"> <li>• Electrolytes</li> <li>• RFT</li> <li>• ECG</li> </ul>

**Note:**

- *Monitor the patient regularly for symptoms and signs of the side effects of drugs as mentioned above. The signs and symptoms should be classified as major and minor side effects.*
- *Perform laboratory tests in sentinel sites as recommended and monitor the results. The recommendation is made in order to identify early side effects and take timely measures.*
- *Periodic reviews at national level should be done and the review should come up with policy recommendations that should be routinely performed in the program to monitor the side effects of medicines.*
- *Emphasis should be made to report the side effects regularly on the given formats to higher levels once in a month for review and feedback*

## Disease Surveillance

Kala-azar, also known as visceral leishmaniasis, is the most severe form and is fatal if left untreated. Epidemics frequently occur in the anthroponotic foci in Nepal, where humans are believed to be the sole reservoir. Surveillance of the disease is essential in establishing the disease burden and monitoring the efforts towards prevention and control of the disease including early detection of epidemics. Kala-azar tends to be largely underreported as most of the data are obtained through passive case detection especially from the government hospitals. However the number of people exposed to infection or infected without any symptoms is expected to be much higher than the number of cases reported.

The disease surveillance can be active, passive or sentinel.

### 4.1 Active Case Detection

Currently four approaches of active case detection (ACD) have been validated for their utility in Kala-azar and PKDL case detection in the Indian sub-continent (Hirve, 2010; Singh, 2011): blanket approach, camp approach, index case based approach and incentive based approach. The *blanket approach* is conducting house to house visit by trained public/private health workers in the endemic areas for detection of Kala-azar and PKDL cases. The *camp approach* is done by organizing health camps in defined Kala-azar endemic communities where screening of Kala-azar and PKDL is done by mobile teams of medical officers, nurses, laboratory technicians, health workers/health volunteers. The community people are pre-informed about the team, its purpose; and the time, date and place of the team's activities. The *index case based approach* includes the search of new Kala-azar and PKDL cases among the households members through house to house visits around a house (radius of 50 meters or 100 households) of a recently diagnosed (usually in the previous 6 months) Kala-azar case. In the *incentive based approach* the search for new Kala-azar and PKDL cases is done through health workers who receive an incentive for each newly detected case by him/her.

#### Rationale for active case search

Kala-azar is mainly a disease of the poor. Their poor health seeking behavior is a complex of many factors. Most of the people living in Kala-azar endemic areas are daily wage earners or small farmers, and one day visit to seek care means absence from work, loss of wage or both. Due to chronic nature of the illness, a Kala-azar case consults local level care providers multiple times. The recurrent cost of treatment depletes their health care resources. They are unaware that the illness is fatal and getting rid of the disease in fact improves their income. Thus, other aspects of livelihood become priority to them rather than seeking health care. Interventions at community level are thus essential to identify hidden cases and thus justify the need for active case search. A recent study conducted in Nepal, Bangladesh, and India suggests that the chance of case detection by active case detection is significantly higher than passive case finding.

Recent research established that all ACD approaches are particularly useful in the Kala-azar endemic areas where the community awareness about Kala-azar and PKDL is low and the actual programme is weak (Singh 2011; Huda 2012). The *blanket approach* is considered the "gold standard", but due to the additional high cost incurred with this method, it is only recommended in outbreak situations. However, in those countries where the health system permits its use by integrating it with other health activities such as family planning activities the cost of the method may not be a hurdle.

The *camp approach* is a sensitive tool for the detection of new Kala-azar and PKDL cases particularly in high Kala-azar endemic areas. For the moderate to low Kala-azar endemic areas and in those areas

where households are scattered, the *index approach* is the preferred method for ACD. The use of the *incentive based ACD* can be a useful method which can be applied particularly in low Kala-azar endemic areas or in combination with the above mentioned methods. The incentive based approach of case detection may induct the snow ball technique for new Kala-azar and PKDL case finding. However, this method needs meticulous supervision and monitoring to prevent misuse of funds.

It has been shown that when conducting the camp approach twice in a year is sufficient to capture a substantial number of new cases of Kala-azar and PKDL in a given area. The index case and incentive based approach have to be organized throughout the year. The blanket approach is recommended for in an outbreak situation.

## 4.2 Passive Case Finding

*Passive case detection (PCD)* includes self-reported cases of Kala-azar and PKDL in the public hospitals and ideally also in the private medical services. This method does not require additional efforts and resources as it is currently part of the existing health system but it has proven to be expensive for the Kala-azar and PKDL patients who are "shopping" for different kind of healers before they finally get diagnosed in the public or private health service. It is useful and sensitive for the areas where the community awareness about Kala-azar and PKDL is high and the health services are actively involved in Kala-azar control.

The existing network of national health care delivery system should clearly understand their roles and responsibilities on Kala-azar elimination program. All suspected cases of Kala-azar attending the OPD at peripheral health facilities need to be referred to level 2 facilities or higher. To confirm Kala-azar, rK39 test will be performed in all these cases at level II and higher level health facilities. Confirmed Kala-azar cases will be started on treatment as per national protocol.

Passive surveillance is an important component of the Kala-azar elimination program. It aims at timely, regular and accurate reporting of the cases who seek diagnosis and treatment from all level health institutions. This is also termed as passive case detection. Each health institution where the KA cases are reported should prepare the report according to the form developed for passive surveillance (Annex 4). The individual treatment card and health institution register should be the starting point of generating the data for passive surveillance. Each item of information requested in the form should be completed while sending the report to the higher level. The health institutions should also maintain a line listing of the cases and the report should be sent to the district public health office at least once a month. But in case of outbreaks, the line listing should be shared to districts immediately and weekly.

The special referral centers identified for Kala-azar elimination program should collect the information through line listing and facilitate on line transmission of data to the center. The basic data set should be common for all the sentinel sites and these special referral centers should take up additional responsibilities which include the following:

- Monitoring therapeutic efficacy of medicines according to agreed protocols
- Quality assurance of diagnosis and treatment
- PCR testing of samples in selected cases as a part of quality assurance
- On line transmission of data
- Development of capacity of staff at all level health institutions

The above information should be categorized according to sex and age groups, i.e. below 5 years, 5-9 years, 10-14 years and 15 or more than 15 years. Further information is required about the pregnant women.

**Table 9: Roles and responsibility at passive case detection of Kala-azar at different levels**

<b>Health Institution</b>	<b>Action</b>
Level I: VHW, MCHW, FCHV	Refer the suspected case of Kala-azar to PHC or district hospital for clinical examination and laboratory test.
Level I: SHP, HP	Refer the suspected case of Kala-azar to PHC or district hospital for clinical examination and laboratory test.
Level II: PHC, District Hospital	Physical examination of suspected cases of Kala-azar by a physician. If there is enlarged spleen, perform rK39 test. Treatment of all confirmed cases of Kala-azar.
Level III: Zonal Hospital	Physical examination by a physician to self-reported and referral case suspected for Kala-azar. If there is enlarged spleen, perform rK39 test. If the result of rK39 test is negative; however, suspicion of KA is high, perform bone marrow aspiration examination.

### 4.3 Sentinel Surveillance

The District Public/Health Office should identify sites for sentinel surveillance of Kala-azar. The sentinel site should have facilities for rK39 test service and treatment of positive cases. Generally, primary health care centers and hospitals in the endemic districts have these facilities. The sentinel sites should send their weekly reports to the district public health office every Sunday. They can send the report either by correspondence, fax, or telephone as per their convenience. However, the information requested in the given format should be complete.

The weekly report would be an official notice to the district for early response to any outbreaks. The report would also be a useful reference for the central and regional level authority for planning and monitoring the program. It is also recommended to visit the sentinel sites at frequent intervals from district, region and center that facilitate improving the quality records and reports including timeliness and completeness of reporting.

Statistical assistant or officer at the DPHO/DHO would be responsible for receiving the reports. S/he should compile and prepare a consolidated district report and send it to Epidemiology and Disease Control Division, Kathmandu with a copy to the Regional Health Directorate and Vector Borne Diseases Research and Training Center, every Monday. Vector control assistant- focal person for Kala-azar elimination program should verify the information during compilation and preparation of the reports.

### 4.4 Surveillance of PKDL

The surveillance of PKDL is as important as surveillance of Kala-azar since the cases of PKDL serve as reservoir for disease transmission during the inter-epidemic period. The program should focus on strengthening the passive and active surveillance of PKDL. The reporting of the PKDL cases should therefore be an integral part of the reporting.

Special efforts are needed for surveillance of PKDL for the following reasons:

- Patients with PKDL have only skin manifestations. Therefore, they often consult skin specialists.
- PKDL can be confused with leprosy and mimic other skin conditions. Therefore, programme integration should be done with leprosy for early detection of PKDL cases. During active search of PKDL cases, suspected cases should also be screened for leprosy and referred to appropriate health facility.
- The patients with PKDL do not have any other manifestations since the patients do not have any discomfort, they do not seek treatment readily.
- The treatment of PKDL is prolonged and the drugs used have side effects. The patient has therefore little motivation to complete the treatment.
- Young patients with PKDL are stigmatized because they are worried that there may be problems in marriage prospects.

## Vector Bionomics and Vector Surveillance

Sandflies are small dipteran (that bite and take blood meal) insects, light or dark-brown in color belonging to the Psychodidae family. They are smaller than mosquitoes, measuring 1.5 to 2.5 mm in length with their bodies and wings densely clothed with hair. Some 30 species of sandflies have been recorded in Indian sub-continent (Subfamily: Phlebotominae, Genus: *Phlebotomus*). Important species (because of their role as a confirmed or suspected vector of Kala-azar) are: *Phlebotomus argentipes*, *P. papatasi*, *P. sergenti*, and *P. punjabensis*, the former being confirmed as the vector responsible for Kala-azar transmission in Nepal.

The life cycle of the sandfly is characterized by complete metamorphosis, comprising of egg, larval, pupal, and adult stages. The eggs are laid in damp dark places in the vicinity of cattle sheds and poultry enclosures. The eggs are comparatively large, and torpedo-shaped with longitudinal wavy lines on the outside. The eggs hatch within 7 days. The larvae are hairy maggots with a distinct head, thorax and abdomen. The last abdominal segment carries two pairs of long stout hairs, one pair is remarkably long. The larva feeds on decaying organic matter and becomes a pupa in about two weeks. The pupal stage lasts for about one week. The average life of an adult sandfly is about two weeks.

### 5.1 Vector Bionomics

*Phlebotomus argentipes* thrives best in alluvial soil, in areas with relatively controlled temperatures, high humidity, and presence of large cattle populations. Eggs and larvae of the sandfly can withstand immersion in water for a period of 5 days and the larvae of the fourth stage can withstand the immersion for a period of 14 days. Thus they can survive even flooding. Breeding places can be found within a radius of about 20-50 meters from a dwelling in dark, humid soil protected from the sunlight, however they are notoriously difficult to find and hence why vector control is not really targeted towards larval stages of the life cycle. In the cattle sheds, the favorite breeding place is underneath cattle troughs while in households, adult sandflies are usually collected from cracks and crevices within walls.

Sandflies are troublesome nocturnal pests. Their bite is irritating and painful while their presence is scarcely observed. They infest dwellings during the night time and take shelter during the day in holes and crevices in walls, holes in trees, caves, stables and store rooms. The females alone bite as they need a blood meal every third or fourth day for ovipositioning. They have a zoophilic tendency and prefer to feed off cattle blood than human blood. Transmission can occur after a heavy build-up of the sandfly population because the sandfly shifts from cattle to humans only after it has exhausted the option of a blood meal from cattle. Sandflies can hop short distances but cannot fly, although slow wind movement could assist flight and help identify an odour plume, therefore increasing the chances of obtaining a blood meal. Sandflies seldom reach a height of more than 6 feet and are generally confined to within 150 feet of their emergence site. The highest risk of disease transmission for Nepal is in the months of June to October when the humidity is high and densities peak. Currently *P. argentipes* in Nepal are susceptible to pyrethroid insecticides that are used in IRS.

If concerted vector control efforts are introduced as part of the Kala-azar elimination programme then interruption of Kala-azar is achievable based on the following factors associated with vector bionomics of sandflies in Nepal:



- *Phlebotomus argentipes* is the only vector to be associated in the transmission of Kala-azar in Nepal to date.
- The vector is so far susceptible to all pyrethroid insecticides that are used or have been used for IRS operations in Nepal.
- There is historical evidence which highlighted the interruption of transmission as a collateral benefit of malaria eradication program, when Kala-azar was virtually eliminated from the subcontinent as a result of IRS.
- Cross border collaboration in IRS operations can interrupt the transmission of the disease. For this, simultaneous IRS operations can be mounted since the areas under the South-East Asia Regional Kala-azar elimination programme have similar seasonal factors.

## 5.2 Vector Surveillance

Vector surveillance is a critical component of the Kala-azar elimination program since it helps to target IRS operations more effectively, based on updated knowledge on vector abundance and behaviour. It is an important part of the elimination strategy because it is also useful in determining the impact of IRS if it is conducted on a regular basis. There are no easy methods for estimating the size of local sandfly populations reliably, however most sampling methods should focus on sandfly adults as immature phlebotomines occupy obscure terrestrial habits.

All levels of the IRS programme have to ensure that it reaches its goal of reducing vector densities to low levels during the transmission seasons. This can be assessed by:

- a) monitoring vector densities
- b) bio-efficacy
- c) vector susceptibility to insecticides

**Table 10: M&E of IRS impact on vector densities, bio-efficacy and insecticide susceptibility**

Topic area	Indicator	Information source	Measurement frequency	Information collector
Vector density	Number of vectors per light trap per night	Documentation of light trapping	2–4 weeks before IRS; 2–4 weeks and 3–4 months after IRS	Entomologist of the public health service or subcontracted academic/research institution
Bioefficacy of insecticides	% mortality in bioassays >80%	Documentation of bioassays (WHO cone method)	1 month and 3–4 months after IRS	Entomologist of the public health service or subcontracted academic/research institution
Insecticide susceptibility	Vector mortality above 80%	WHO tube method with impregnated papers	Once per year before IRS	Entomologist of the public health service or subcontracted academic/research institution

## **Integrated Vector Management**

Integrated Vector Management (IVM) is “a rationale decision-making process for the optimal use of resources for vector control”. Through evidence-based decision making, IVM rationalizes the use of human and financial resources and organizational structures for the control of vector-borne diseases and emphasizes the involvement of communities to ensure sustainability. It encourages multi-disease control approaches, and integration with other disease control measures for synergistic effect. The benefits of developing and utilizing IVM originate from the facts that some disease vectors are responsible for multiple diseases and some interventions are effective against several vectors of major vector-borne diseases malaria, dengue, lymphatic filariasis, Japanese encephalitis and Kala-azar of this region.

The key elements of an IVM strategy are: advocacy, social mobilization and legislation, collaboration within the health and other sectors for an integrated approach, evidence-based decision making and capacity building. Key characteristics of IVM include the following:

- Utilisation of methods based on an evidence base (in which there has been recorded impact against local vector populations), disease transmission, and morbidity.
- Use of a range of interventions, often used in combination for their synergistic effect.
- Collaboration within the health sector and with other public and private sectors that work on cross-cutting issues associated with disease vectors.
- Involvement of local communities and other stakeholders.
- A public health regulatory and legislative framework.

Prevention of Kala-azar through vector control is one of the major strategies in the elimination of the disease. Country guidelines and standard operating procedures for the prevention of Kala-azar through IVM strategies require standardised application of the right mix of interventions based on local vector species and vector bionomics. Vector control options for the elimination of Kala-azar in Nepal comprises of indoor residual spraying (IRS), personal protective measures, and environmental modification/manipulation techniques.

### **6.1 Indoor Residual Spraying (IRS)**

At present, indoor residual spraying forms the mainstay of the vector control programme component. The objective of IRS is to ensure for the safe and standardised application (uniform and complete) of a residual insecticide to indoor surfaces of all houses and animal shelters selected in target areas so as to obtain a marked reduction in sand fly populations, and consequently a sharp reduction of Kala-azar transmission. In order to maximize the impact of the elimination programme, IRS and active case surveillance should be synchronized.

The success of IRS operations depends on effective planning, training, and implementation of the plan especially at the district level to maximise household coverage in targeted areas to achieve a “mass-effect” on local vector populations. The plans for IRS operations should be developed in advance so that there is timely delivery of the programme during the “window of opportunity” (usually just prior to the on-set of the monsoon season when disease transmission is predominantly seasonal). The plan should include the following key stages:

### **6.1.1 Identification of areas for IRS**

Targeted areas to be sprayed should be selected according to local vector behaviour and spatial distribution. The program should aim IRS coverage on the programme's capacity to achieve complete and uniform coverage. If there are resource/logistical constraints, it is preferable to limit the size of the operation in preference to achieve maximized coverage, rather than to have patchy household coverage over a larger area in which impact may not be sufficient to reduce infective vectors and thus reduce disease transmission. The number of houses to be sprayed in the villages should be identified according to the VDC or Municipality selected for IRS. The entire village should be covered if selected for IRS. The areas to be sprayed can be identified best by mapping (of the areas) based on the following criteria:

- All villages that reported a case of Kala-azar during the last three years.
- All villages that report a case of Kala-azar during the current year.
- Villages that have cases on active surveillance.

### **6.1.2 Timing of IRS**

Timing of IRS is critical; it should be decided based on vector behavior, density, and spatial distribution from longitudinal vector surveillance and the disease transmission season. Two rounds of IRS should be considered in a year. The objective of the first round should be to obtain maximized coverage in targeted areas. When the WHOPEs approved insecticide is used, the residual effect of IRS should last for a period of approximately 3 months. The second round of spraying should not be considered a "mop-up" round but is to be done to sustain the effects of the first round and maintain a "mass-effect" against local vectors, and thus curtail the transmission of Kala-azar.

The first round of spraying should be completed when the vector population is building up but prior to when the transmission season starts. A seasonal density curve should be prepared by vector surveillance in order to decide the optimum timing for spraying. As an illustrative example, the build-up of the vector occurs in the month of March and peak densities can be found between July to October. The maximum effect of insecticide lasts for a period of about 10-12 weeks and the transmission season lasts from June until October. Therefore, the first round should be undertaken in the months of May-June. The second round of spraying should commence approximately 3 months after the first round but may have to be scheduled according to meteorological forecasting during the height of the monsoon season. In the case of targeted areas which are endemic for malaria, scheduling of IRS delivery may have to also take into consideration the seasonal transmission of malaria, so as to combine efforts and resources for each round of spraying to target both diseases.

### **6.1.3 Insecticide selection and quantity estimation for IRS**

The choice of insecticide for IRS is based on several considerations that include national policy, formulations that have WHOPEs approval, cost of insecticide and efficacy of the insecticide. Insecticide will be selected on the basis of following criteria:

- Should have a long lasting effect on a given surface to prevent necessity of repeated application
- Highly toxic to the target insect
- Least repellency to the insect
- Safe to humans and domestic animals
- Acceptable to the community
- Stable during storage and transportation
- High grade suspension so that it mixes well with water and does not clog equipments
- Cost effective

Based on the above criteria in combination with national policy and legislation, insecticides belonging to the pyrethroid group will be selected for use in the IRS programme. Large-scale use of pyrethroids both within the public health and agricultural sector may increase the selection pressure for “knockdown (*kdr*)” resistance mechanisms to evolve in local vector populations, and so routine insecticide susceptibility testing should be completed on operational insecticides as well as those selected as future alternatives.

**Table 11: Guideline for using synthetic pyrethroids for indoor residual spraying**

Insecticide	Recommended dosage (gm/m <sup>2</sup> )	Require quantity	Effectiveness (months)
Alphacypermethrin 5% WP	0.03	100 gm /8 liter	2-3
Cyfluthrin	0.025		3-5
Cypermethrin	0.5		4 or more
Deltamethrin 5% WP	0.05	160 gm /8 liter	2-3 or more
Lambda cyhalothrin10 % WP	0.05	50 gm /8 liter	2-3
Permethrin	0.5		2-3

(Note: Insecticidal action is contact)

The dosage of insecticide application for prevention of Kala-azar is the same as for Malaria. The dose varies with the type of insecticide selected for IRS as shown in the above table. For example if Alphacypermethrin 5% WP is used 100 gm of Alphacypermethrin 5% when dissolved in 8 liter of solvent, the dose will be 0.03gm/m<sup>2</sup>. When the spraying is done for Kala-azar, the requirement is only half of that for malaria since the walls are to be sprayed up to a height of 6 feet only and the cattle sheds are to be covered. The average area to be sprayed per house is about 75 square meters. In areas where malaria is common, the calculation of insecticide should be done for malaria which would also cover Kala-azar. The requirements can be calculated based on the recommendations summarized in the table above. Based on previous experience of IRS programming for malaria prevention, an 8 liter suspension of the insecticide can conveniently be prepared and carried from house to house.

#### 6.1.4 Equipment requirements for IRS

The equipment requirements for IRS are determined on the basis of the national strategy, timelines for implementation, human resource capacity, and areas to be targeted. Hand operated compression pumps can be considered since the use of this equipment requires one operator and spraying of better quality can be achieved.

Each spray team would need the following equipment:

- Hand compression pumps: 4
- Spray nozzle tips for spray pumps: 4
- Bucket 8 liters: 1
- Asbestos thread: 3 meters
- Measuring mug: 1
- Straining cloth: 1 meter
- Pump washers: 4
- Plastic sheet 3 x 3 meters: 1
- Register for records: 1
- Writing material to identify households covered by IRS
- Tools for minor repairs
- Personal protection equipment for each member of the team

### **6.1.5 Human resource requirements for IRS**

The operation of IRS should be completed in a maximum of 45-60 days but may vary depending on targeted areas in any given year and the human resources and equipment that may be available. Prolonging the duration of the first round of IRS would make operations difficult since there would be problems in timely undertaking of the second round of spraying in a timely manner. Usually labor on a daily wage is employed to undertake the job which includes time for training. The spray teams should be supervised adequately to ensure the quality of household coverage of insecticide, i.e. correct dose, uniformity and completeness of wall spraying, and continued maintenance of machinery. The supervisor of the spray teams should be a regular staff member of the spray team. The average number of persons for “spraying team” should comprise of 4 field workers and one supervisor (experienced field worker who can provide spot checks and provide continual technical assistance). Four such teams form a “spraying group”. The group is headed by group leader, who must be a government employee and a health worker. Additionally an “insecticide distributor” (I.D) supports the group to prepare and distribute insecticide. The number of houses to be sprayed is determined by the terrain in which the team is operating.

District planning is needed to identify the number of houses to be sprayed in target areas based on the criteria outlined previously on disease transmission risk. The number of houses to be covered in a village would vary according to density of population in a particular target VDC or municipality. The population to be covered should be divided by 5 since each household has an average of about 5 members. The district plan should include a plan for IRS operations based on the criteria identified above. The plan should include identification of dates when the selected villages are proposed to be sprayed. Each supervisor should then develop a plan for each spray team. This plan should be used to calculate and forecast insecticide quantities, which should be supplied and safely stored at least one week before spraying commences.

The number of spray teams that would be required in each district can then be ascertained by calculating the number of households to be targeted and how many can be sprayed per day by a given person and therefore how many sprayers would be then needed to provide optimal coverage in a given period of time. Each spray team should be adjoined by a trained health worker either from the local health institution or from the district health office to provide national representation and support. This individual is different from the spray team supervisor who monitors technical aspects with regards to spraying.

### **6.1.6 Training of the spraying team**

Training of IRS team is essential for quality of IRS within a geographic area. The team comprises of the health workers who are responsible for supervising the overall IRS operation within a given target area and training of the spray teams; and training of the spray team supervisor who monitors coverage rates and day to day technical issues and machine maintenance. The district focal point for Kala-azar and/or malaria is responsible for organizing the training.

The training agenda for spraying team should include the following areas:

- Informing target communities and obtaining cooperation from them
- Preparation of insecticide suspensions/solutions
- Correct use of IRS equipment
- Importance of uniform and complete spraying
- Regulation of flow from nozzle tip
- Regulation of speed of application, including movements of the lance and spray persons
- Safe storage of the insecticide
- Safety precautions and personal protection measures during the spraying operation

- Care and maintenance of IRS equipment
- Safe disposal of insecticide and waste
- Preparation of daily consumption reports

Additionally, supervisors should be trained in:

- Enumeration of houses
- Marking of houses
- Mapping
- Cleaning procedures
- Raising community awareness/provision of advance information
- Record keeping and reporting
- Safety and precautionary measures.

Practical sessions are required during the training which focuses on the correct use of spray equipment and the steps required for preparation of the insecticide suspension, effective dispersal and coverage, and safe disposal of any unused insecticide. In addition, during field based training of the spray team, allowances should be made to include active involvement of the community to ensure household compliance during the spraying campaign. The training of the spray team supervisors should also include practical aspects such as equipment troubleshooting, maintenance checklists, safety precautions and first-aid assistance.

Such training should be completed at least one week before the first round of spraying operations in targeted areas. However, a long interval between the spray operations and the training is not beneficial, as trained personnel may not clearly remember all aspects of the training modules. Training should be an integral part of the district work plan for the Kala-azar elimination program. The district health office should prepare a report on training of the supervisors and the spraying teams and send it to regional and national departments.

#### **6.1.7 Transportation, storage, safe handling of the insecticides**

The containers in which the insecticide is transported should be well sealed and properly labeled. The transport of insecticide should not be done along with transportation of food items. In consultation with the community, the insecticide should be stored in a safe place where the chances of contact with humans/animals are minimal. The insecticide should be properly labeled with the name of the insecticide, the name of the manufacturer, date of manufacture, the date of expiry, and appropriate visible labeling that hazardous chemicals are contained within. There should be written guidelines with each container/sac on what to do in case there is exposure to the insecticide. The insecticide should be stored in a well-ventilated room, not exposed directly to sunlight, and away from the walls. The place where the insecticide is stored should be away from the reach of children and animals. It is important to be sure that no food items are stored in the vicinity of the place where the insecticide is stored. During the storage process insecticides should be moved carefully so that there is no spillage. The stocks that arrive first are to be used first and make sure that the expiry date has not been exceeded prior to its use.

Stock registers should be carefully maintained to keep a track of insecticide dispatch to targeted areas. No unauthorized person should have access to the insecticides. The room where the insecticide is stored should be kept locked and a large label indicating that “hazardous materials” are being stored should be highly visible. Eating, drinking and smoking is not permitted in the place where the insecticide is stored, nor such habits are allowed during the spraying operation.

### **6.1.8 Informing and involving the community**

The spray team supervisors should inform the community leaders and key persons in targeted villages about the plans and timelines for the spraying operation, at least a week before the spraying is done. The spray team members should re-visit targeted areas to remind them about spraying activities at least one day before the operation is to commence. During the first visit to targeted areas the following issues/tasks should be discussed with the involvement of community leaders and key persons in the community:

- Distribute brochures or leaflets (in local language) explaining the purpose of the spraying and including the common do's and don'ts (Annex 10) before and during the spraying operation. If possible, simple illustrations should be included in the sensitization materials to facilitate easy understanding amongst those who may not be literate. This sub-activity forms part of a behaviour change communication (BCC) strategy.
- Explain to the community leaders/key persons that it is their responsibility to share the contents of the brochure or leaflet to the people in the community.
- Explain about what is proposed to be done, why this is an effective way of preventing Kala-azar and contributes to the control of malaria and that why community compliance is key to the success of the programme.
- Inform the community leader of the proposed date for spraying in their village.
- Discuss what specific role the community leaders and key persons can play to ensure that the spraying is complete and thorough. This would require that no household is missed and the spraying in each household and animal shelter must be complete.
- Explain that if surfaces are not sprayed adequately the sand fly may rest on unsprayed surfaces and the desired effect of spraying will not be obtained.
- Make community leaders aware that the insecticide can harm people if contaminated food items are ingested. Therefore it is very important that food items must not be exposed to the insecticides.
- Explain that each household must not mud plaster the walls and other sprayed surfaces for 6-10 weeks after the completion of spraying. Therefore it is important that any building maintenance should be conducted prior to spraying.
- Inform the community people one day prior to the spraying operation through loudspeaker microphone messaging.

### **6.1.9 Supervision and monitoring of IRS activities**

Supervision is an essential and integral part of IRS to ensure its efficacy and safety. This should be thorough to produce programme impact and ensure that there is no compromise to safety. There should be a written plan for supervision and supervisory checklists are to be developed and used. Supervision will be effective if problems are identified and they are solved by the supervisors as soon as they are detected. Any unsolved problems should be referred to district authorities for resolution. All supervisory reports should be sent to the district to facilitate any follow up actions. The supervisory reports should be kept safely in the district and where possible an electronic copy be made.

*Daily Summary Report*

<b>Health Institution</b> (Name & address):								
<b>Date:</b>			<b>VDC/Municipality:</b>					
<b>Ward No</b>	<b>Date</b>	<b>Village</b>	<b>Target</b>		<b>Sprayed</b>			<b>Remarks</b>
			Houses	Rooms	Houses	Rooms	Locked/Refused	

*Daily consumption record of insecticide*

<b>Spray operations on</b> (day/month/year):			
<b>VDC/Municipality:</b>		<b>Ward No:</b>	<b>Village:</b>
<b>Insecticide issued</b> (Qty: WP)	<b>Balance</b> (insecticide available from previous day)	<b>Number of buckets (8 liters)</b>	
		Prepared	Consumed

The following points should be taken into consideration in supervision and monitoring of IRS activities:

- Check the availability of plan with the spray team.
- Review the plan and monitor activities to ensure that the plan is being followed.
- Ensure that all members of the spray team are present and are conducting activities to agreed specifications under the timeline for employment.
- Check that the spraying is being done correctly according to standard operating procedures.
- Examine the spray equipment daily to ensure that it is in good working condition and is being properly maintained.
- Ensure that spare parts for maintenance are in stock and deployed to the spray teams in advance so as not to affect daily coverage targets.
- Visit the households with the spray team if there is a household refusal or reluctance for spraying.
- Check the records of the spray teams.
- Discuss about the plans for “mopping up” activities to cover any households in which initially there was refusal or the house was vacant.
- Assess the consumption of insecticides and make arrangements for additional supplies if required.
- Prepare a daily summary report and send the consolidate report to the D(P)HO once a week.
- Review the spraying schedule for the following week.



***The supervisor should undertake the following activities whilst on a supervision mission:***

- *Visit randomly selected households and ask whether the house was sprayed or not.*
- *If the house was sprayed, then check for grey white deposits as evidence for spraying, and check on different parts of different walls to ensure there is overall coverage.*
- *Check whether the deposits are uniform or not. Uniform deposits indicate that the spraying was satisfactory*
- *Check to see if any portions of the dwelling or the cattle shed were skipped.*
- *Check whether the walls have been plastered with mud. If the walls have been plastered then determine when this was done to determine the time interval between the IRS and the plastering.*
- *Visit the households that were not covered and find out the reasons for non-coverage. Try to express the importance for household members to get their houses sprayed as a part of special “mop-up” drive.*
- *Prepare a written report along with recommendations and share with the spray teams to ensure that any mistakes are corrected as soon as possible.*

### **Good and poor IRS practices**

Bad practice is not uncommon during spray activities. The following highlight the most common issues and what should be done:

- external walls should not be sprayed;
- spray solution should not be carried in damaged buckets;
- hanging objects/pictures/photos etc. should be removed and stored elsewhere before walls are sprayed;
- leaking nozzle tips and lances waste large amounts of insecticide and should be replaced;
- food grains should be covered with plastic sheets before spraying;
- spray persons should mix formulations well away from any source of drinking water;
- ideally, a van with a banner should visit villages to provide advance warning of the next day’s spraying;
- supervisors should visit spray squads to ensure work is carried out properly and efficiently.

#### **6.1.10 Proper disposal of insecticides and containers after use**

The unused insecticides or contaminated residues from washed equipment and protective clothing should be disposed off safely, to ensure that it does not mix with water or food. Prepare only the required quantity of insecticide suspension, which is likely to be consumed in one day and ensure that there is no carryover of any unused insecticide the next day. Never put any leftover insecticide into a river, pond, well or source of drinking water where it can persist in the ecological chain causing pollution and/or poisoning. Any spilled insecticide in solid or liquid form, and residues from washed equipment and protective clothing should all be emptied into a pit which is dug away from the source of drinking water and covered with mud. Empty sacs or containers in which the insecticide was stored should not be used for any other purpose. These must be buried safely away from the drinking water source. All empty containers/ sacs should be returned to the supervisor. The supervisor must check carefully that all empty sacs/containers have been received.

### **6.2 Personal Protective Measures**

The use of insecticide treated bed nets (ITNs) or long-lasting insecticide treated bed nets (LLINs) can be an effective, relatively cheap, and sustainable method of vector control. The synthetic pyrethroids used for the treatment of bed nets contain chemicals of low to moderate mammalian toxicity, low volatility and high insecticidal activity. Untreated, locally available bed nets are also associated with a decrease in Kala-azar risk and can offer a degree of barrier protection. The

protective efficacy of bed nets has been observed in both Bangladesh and Nepal and intervention trials of ITNs in Afghanistan demonstrated strong protective efficacy against leishmaniasis transmission. The efficacy of bed nets is increased when there is a demand by the community as use will be high, for this often a complimentary BCC campaign needs to be conducted prior to net distribution. It is often argued that the small size of sand flies means that the mesh size used in standard bed nets for malaria control would allow sand flies to still obtain a blood meal. However field experience indicates that even with larger mesh size, insecticide treated nets can cause a reduction in sand fly populations, or the insecticide incorporated into the netting can serve as a deterrent.

Individual protective measures in outdoor areas include application of repellents, such as diethyltoluamide (DEET) or natural based chemicals that are known to repel vectors, to the skin or clothing to reduce man-vector contact. Portable mosquito coils could be effective but have not been evaluated for the use against sand flies. Indoor protection from sand fly bites can be obtained by the use of fine-mesh screens on windows and doors, insecticide treated curtains, mosquito coils, electrically heated fumigation mats and fumigant canisters.

### **6.3 Environmental Management**

The following environmental measures can be considered as a part of the integrated vector management strategy for the prevention of Kala-azar in Nepal:

#### **6.3.1 Household modification and relocation**

Kala-azar affects primarily poverty stricken groups in rural communities, who are either marginal farmers or landless labourers. Their houses usually consist of mud huts with thatched roofs which invariably do not meet the requirements of low income housing and pre-dispose residents to pest infestation and increased vector-contact which in turn contributes to higher rates of illness in such groups. Such poor dwellings are characterized by the absence of secure foundations, imposing limits to the height of walls that can be supported resulting in low houses with inadequate ventilation and dark interiors. Rainfall damage concentrated at the base of the walls opens up crevices and cracks and uneven earth floors provide refuge for insect larvae among the debris in the cracks.

Sandflies like all arthropods require shade, and an undisturbed resting site within the houses for part of their lives. They generally rest during this inactive phase in the dark crevices near the floor, walls or even eaves of low roof's and also in the moist corners of such houses.. Such moist corners with loose soil are also suitable breeding sites for the sand fly vector. Because of the propensity of resting and breeding in particular household, where human blood meals are readily available; where applicable community based interventions should focus on simple structural modifications that prevent entry of host-locating sand flies. In more extreme cases re-housing to suitable buildings with adequate space and ventilation, and which are not liable to cracking is an important, additional input into the Kala-azar elimination program.

#### **6.3.2 Environmental manipulation in peri-domestic areas**

Cleanliness of households and cattle sheds is a measure potentially useful, but has never been scientifically evaluated. This approach needs to be pilot tested in a sufficient sample and range of villages to measure impact on sandflies in Nepal.

## Behavior Change Communication

The national program for Kala-azar elimination is currently focused on increasing the awareness about the program to general population. The information gap does not only occur at the community level but there are issues that need to be cleared and consulted with the policy level decision makers. A strong political commitment, appropriate strategies, development of a strong program network, community involvement and empowering the community with information are key to achieving elimination of Kala-azar at national and district level by the end of 2015.

Like in other aspects of the program, a thorough analysis of the problems related to BCC is essential to devise methods that are effective and long lasting. To provide technical inputs, communication experts have been consulted. The program managers on recommendation from communication experts have been adapting COMBI approach to reach mass population. Special attempts have been made to reach the poor, illiterate and marginalized groups. The information that the program has been providing diagnostic and treatments free of cost to all people infected with Kala-azar, has failed to reach the target population due to many reasons. The current BCC strategy aims to bridge this gap by devising methods and messages that are pre-tested, specific, simple, and culturally sensitive that reaches and is understood amongst wide geographical areas and communities.

The program considers that increase in knowledge and awareness does not necessarily bring about a change in behavior. For behavior to change, it is important to make sure that as a first step people are informed about the problem and solutions. An enabling environment is needed to encourage the people to take healthy actions. Finally it is necessary that the action is sustained to have an impact.

### 7.1 BCC Strategy

Behavioral change communication strategy is needed for the following reasons:

- To influence planners, policy makers, other stakeholders for intersectoral collaboration
- To mobilize additional resources and optimally use the existing resources
- To use ‘influencers’ in the community for the empowerment of the community
- To empower and motivate community with information for appropriate behavior
- To get maximum output vis-à-vis the inputs
- To get behavior impact
- To monitor and measure the impact.

The behavior change communication strategy should define clearly following aspects:

- Why behavior change communication is required?
- What are the specific actions that comprise BCC?
- Who are the care takers and care recipients?
- When is BCC activities proposed?
- Where is BCC activities proposed to be undertaken?

### 7.2 Three Basic Elements of BCC

**a. Advocacy:** Advocacy is a continuous and adaptive process of gathering, organizing and transforming information into arguments. Advocacy is a strategy to develop an enabling environment to influence political leaders, elected representatives, planners, policy makers, corporate sector, media, organized sectors, professional bodies, academia and media. These arguments are then communicated to decision makers at different levels to make it easier for

affected communities, families and individuals to make healthy choice for their own physical and social well-being.

The Government of Nepal is committed to eliminate Kala-azar from district level by 2015. The commitment needs to be re-strengthened at an advocacy meeting at ministerial level. During the advocacy meeting, the Memorandum of Understanding signed by the health ministers of Bangladesh, India and Nepal during the World Health Assembly in May, 2005 committing to mutual cooperation towards elimination of Kala-azar from their respective countries will be highlighted. The program will gain momentum if Kala-azar elimination is declared as a national priority.

WHO/RTAG on Kala-azar recommends integration of active case finding in endemic areas. Active case finding identifies hidden cases in the community because diagnosis of Kala-azar is done at local level. The intervention provides an opportunity to diagnose cases of Kala-azar missed by passive case detection and the new cases can begin treatment early. Advocacy at DoHS will provide a forum to discuss further on the new interventions available to achieve the elimination goal. The national Kala-azar elimination program envisions achieving the goal of elimination by incorporating the support of interested private partners and foster Private Public Partnerships (PPPs) to further support the program. An advocacy meeting with all interested partners is thus a necessity. The forum will be used to identify the different areas of interest of the partners.

The objective of advocacy is to enlist their commitment on a sustainable basis. Advocacy is thus needed to create policies or reform existing policies, and ensure that policies are implemented. There are a variety of advocacy strategies, such as discussing problems with policy makers, contacting political representatives, delivering messages through the media, writing letters to the editor/articles, strengthening the ability of local organizations to advocate, organizing community meetings, distributing educational materials or other means to communicate one's views. However, advocacy should be initiated at different levels. Such as:

- Sustained and appropriate advertising, which is massive, repetitive, intense and persistent using a blend of channels by partnering with media.
- At the community level, community mobilization, involving self-help groups, local government, informal service providers including faith healers, schools, traditional media, song and dance, drama is important.
- At the local level, 'Influencers' can play an important role in advocacy for the program. These are the people who have suffered from Kala-azar and recovered as a result of treatment.
- Influencers can also be local influential people who are supportive of the program. They need to be articulate and interested in participating in the behavior change effort.
- This strategy of personal selling through interpersonal communication is known to contribute substantially to impact. It involves listening to the problems of the people and identifying solutions for solving them.
- Point of service promotion at community level as well as fairs/festivals to emphasize and coordinate the behavior change communication with effective delivery of the products and interventions have better impact.

**b. Communication:** Communication attempts to bridge the gap between information, a person's knowledge, attitudes and subsequent behavior. This approach addresses the knowledge, attitudes, practices and skills of individuals, families and communities as they relate to specific program goals. Communication requires a sound understanding of the audiences and the use of an appropriate mix of communication channels- interpersonal, group, community and mass media. It also recasts the role of the communicator as facilitator rather than expert. Effective communication has proven to be more effective when complemented by well-planned and implemented advocacy and social mobilization.

**c. Social mobilization:** The purpose of social mobilization is to bring relevant inter-sectoral partners to determine the needs and raise awareness for a particular objective. It involves the identification of organizations, institutions, groups, networks and communities who can contribute their efforts and resources. This approach should support actions and priorities identified by communities especially the most vulnerable groups whose needs tend to be consistently denied.

### 7.3 Steps in Developing a Communication Plan

A plan is necessary to ensure greater behavioral impact. It allows us to get the most out of our budget, to measure any changes, to motivate people to achieve intended results. When we develop a behavior change communication plan, design each step to be as participatory as possible. Participation in all steps of the process allows ownership and helps affected communities achieve a sense of normalcy in their system.

Here are some steps that we can follow in developing the detail of a communication plan:

- (a) Determine the target audience and define **SMART** behavioral objectives and results:
- **Specific** in terms of an issue of a specific group and of the geographic location
  - **Measurable** in such a way that changes in people's behavior can be measured, either quantitatively or qualitatively.
  - **Achievable** in that the behavioral results correlate to a target that can be attained for which all necessary resources are identified and budgeted.
  - **Relevant** so that the planned behavioral results represent a milestone in the results chain.
  - **Time bound** in that a time frame has been set within which change is expected to happen.

Behavioral results are best stated in terms of the intended behavior change or the maintenance of an existing desired behavior. A behavioral result usually has at least three features, which makes it a SMART result. They are clear identification of the target audience, detail description of the promoted behavior- appropriate and realistic and how many times the behavior should take place, and the measurable result we hope to observe over a specific time period.

- (b) Determine the details of communication plan.
- Which combination communication strategies to use: advocacy, communication and social mobilization
  - Which communication activities, main messages and materials?
  - What mix of communication channels?
  - What is the dissemination plan for the communication messages?
  - What is the time line for communication activities?
  - What is the monitoring plan including indicators, means of verification, evaluation, documentation and reporting?
  - What is the total budget?
- (c) Establish a monitoring system.
- (d) Evaluate and re-plan.

It is necessary to identify the target audience that share similar characteristics and are most likely to respond to similar stimuli for bringing about a change. There are certain segments more in need of the behavior interventions than others. Since they are the poorest of the poor, there are not likely to be any political sensitive if resources are committed. Within this segment there are more willing groups and others who are not quite ready. The willing groups should be targeted first. The segment

chosen should be large enough and reachable. The size of the target group should be manageable and the resources should be adequate to be able to reach the segment.

We should remember that information alone, using IEC materials, is not enough to influence sustainable healthy behaviors and to create a supportive social environment. If our strategy is dominated by one way information dissemination, it may result in increased awareness but may have limited impact on improving behavior. It is critical for us to stimulate shared learning through dialogue, participation and discussions with members of the affected communities. Involving affected families and communities allows them determine among themselves what needs to be done, and by whom in the long run, thus establishing a sense of ownership.

## **7.4 Use Appropriate Communication Channels**

In order to help reinforce the information, we should choose more than one communication channels. Beyond using mass media and small media, interpersonal communication and participatory community based media are dispensable channels to lead communication efforts aimed at improving or changing behaviors and in sustaining such behaviors. Therefore, we should consider the following points while choosing the right mix of channels:

- How do affected families and communities seek information?
- How do affected families and communities share information?
- Who are trusted and respected spoke persons in the community?
- Which groups have access to public address systems, radios or TV?
- Which groups among the affected population do not have access to any media?
- What traditional, telecommunication and mass communications and mass channels are available?
- Which group can we reach via community based group channels such as social or religious functions?

## **7.5 Communication Channels**

### ***a. Mass media***

The mass media include print, radio, television and cinema. These mass media can reach a large number of people in a short time. These channels are most effective when coupled with other communication approaches through which the affected community can talk the information with someone whom they trust, such as community opinion leaders.

### ***b. Small form community media***

Small form community media are often the most practical, useful and effective in reaching affected people. These media include local FM radio, community bulletin and loud speakers. We can use these types of small community media to quickly disseminate information to a camp or affected community. With community coordination and support, we can plan, conceptualize, produce and disseminate message with affected community members.

### ***c. Interpersonal communication (IPC) channels***

Interpersonal communication refers to face-to-face communication. It can either be one-to-one or in a small group. IPC makes it possible for people to exchange information, express their feelings and obtain immediate feedback, respond to questions and doubts, convince and motivate others to adopt certain behavioral practices. However it requires listening skills, the ability to empathize and be supportive. It is particularly useful in counseling approaches such as through hotlines, clinic

consultations, in training, community health volunteers, peer educators and facilitation group meetings where the affected community can share and discuss the issues at hand.

#### ***d. Peer educators***

Peers are persons who belong to the same age group and socio-cultural background. IN addition, to promoting healthy behavior, we can build local capacity by training peer educators in effective communication and participatory approaches. These individuals can continue to pass on message through casual conversation with friends, family members and their wider peer groups.

#### ***e. Participatory drama***

This type of communication method allows the affected community to be directly involved in the drama itself. This gives individuals greater control and helps them to explore issues and possible solutions. Participatory performance emphasizes working with and from the affected community's own reality and choosing their own modes of expression. Local people replace outside script writers, illustrators, editors and actors and become actively involved in creating and exploring solutions to a real life situation.

#### ***f. Local folk media***

Local folk media can include music, local art, local theaters, puppetry, drawing or dance. Many affected communities have their own traditional media forms to express themselves. Local ways of communicating are powerful avenues to stimulate psychological healing, return to normalcy and motivate affected families and communities to practice healthy behaviors.

#### ***g. IEC materials***

IEC materials with prepared messages can be conceptualized as part of a communication. We can easily adapt and produce these as part of our BCC program provided messages, design and presentations are duly pre-tested with the intended audience groups. Producing and disseminating IEC materials can be a quick way to reach a large number of people. This form of communication typically leads awareness raising issue and serves to reinforce existing knowledge and practices but this may not necessarily lead to changes in behavior. IEC materials include radio public service announcement in print form, posters, leaflets, brochures, videos, flip charts, banners and promotional item like T-shirts, cap, badges.

### **7.6 Key to Success in BCC**

- Elaborate plans for communication and sharing of knowledge and information, which should be an integral part of the strategy.
- Behavior change communication should be implemented only when the product is accessible, available and affordable to the target audience.
- The strategic plan for communication should be implemented in a pilot situation and it should be revised based on the pilot experience.
- Involvement of the community is important for the success of Kala-azar elimination program.
- The poor communities need to be involved maximally in the elimination program.

## 7.7 Key Messages

The following messages are identified as key messages and recommended to use while developing IEC materials for Kala-azar elimination program:

**Table 12: Key messages for Kala-azar elimination program**

Focus area	Key messages	Target audience
Early diagnosis and complete treatment	<ul style="list-style-type: none"> <li>• Kala-azar is a curable disease.</li> <li>• Kala-azar kills if left untreated.</li> <li>• You might have suffered with Kala-azar if you have fever for &gt; 2 weeks.</li> <li>• Go to nearby health institution for check-up if you have above symptoms.</li> <li>• You should take full course of medicine if diagnosed as Kala-azar.</li> <li>• Diagnosis of KA and treatment is made available at free of cost.</li> </ul>	Kala-azar patients, Patients' family, Community people, Community leaders, FCHVs, School teachers, School students.
Ensure uniform and complete coverage with IRS	<ul style="list-style-type: none"> <li>• IRS is very effective in the prevention of many vector borne diseases including kala- azar, malaria and encephalitis.</li> <li>• It should be done two times per year.</li> <li>• Spraying should be done within the households, animal shelters and places where animal wastes are present.</li> <li>• Each household should cooperate and help the spray team to identify above mentioned areas.</li> <li>• All the surfaces to be sprayed should be cleared.</li> <li>• Keep foods and food products covered and make sure that these are not sprayed with insecticides.</li> <li>• To ensure maximum effect of the insecticides, do not wash or mud plaster the sprayed surface for a period of 8-10 weeks after the spray.</li> </ul>	Family members Community leaders School teachers FCHVs
Personal protective measures	<ul style="list-style-type: none"> <li>• Kala-azar is caused by the bite of sandflies.</li> <li>• The sandflies bite most often between dusk and dawn.</li> <li>• Protect yourself from a bite especially between dusk and dawn.</li> <li>• Wear long sleeves clothes to prevent the sandfly from biting.</li> <li>• Use mosquito repellants to keep the sandfly away.</li> <li>• Sleep under bed nets to prevent the sandflies from entering the nets.</li> </ul>	Individuals Community leaders FCHVs School teachers
Environmental management	<ul style="list-style-type: none"> <li>• Keep household and surroundings clean and reduce the breeding sites.</li> </ul>	Family members Community people

**Note:** During the active case finding period, the key messages should be disseminated targeting the affected community through the means of miking, FM radios, interpersonal communication and mass meeting.



## **Supportive Supervision and Monitoring**

Supportive supervision and monitoring has replaced the traditional supervision methods. During the time of supervision, local health facility staff and community have a chance to clear confusion about the program or its different aspects. The district, RHD, and the center have supervisors with good technical knowledge and skill and long experience of working in the program. A supervisor needs to understand that his time at field is an opportunity to correct technical shortcomings observed during the implementation of the program. During the visit, supervisor should update the health worker with recent knowledge and skills. A supervisory plan is based on data analysis and identifying priority areas. The plan should be shared in advance with the HF staff, so that they know the objective, date and time of the visit in advance. This information will start their initial preparation for the visit and by the time of the visit, initial corrections are already in place. To ensure uniformity, the supervisors will visit the HF and assess program with the help of a pre tested checklist developed by the national program. After assessing the program the supervisor will provide both the positive and negative feedback to the HF in charge or program focal point. Aspect of the program that needs improvement needs to be followed up. To do perfect supervision needs time. A supportive supervision will only meet the objective if adequate time is spent during the visit.

Quality supervision is a source of accurate information on strengths and weaknesses of Kala-azar program and thus an opportunity to perform qualitative analysis of the program. The inference derived is an important compliment of quantitative data analysis and helps to reach the root of the program problems and find solutions. All supervisory finding at district level should be shared with center, RHD, and the sub district level.

The health workers working at health post and sub-health post level should be aware of the case definition of Kala-azar, availability of diagnostic tests at the nearest PHC or hospital including other lab investigations required for monitoring the side effects. They should be aware of side effects of drugs including its management. So, the district health office and PHC should monitor the following activities that are supposed to be carried out by the health posts and sub health posts:

- Kala-azar cases referred to PHC or hospital on the basis of given case definition.
- Follow up visit of the cases under miltefosine treatment.
- Referral cases under miltefosine treatment if they develop any side effects.
- Recording and reporting of Kala-azar related activities.

PHC has the responsibility of diagnosis of every suspected case of Kala-azar by using rK39 test kit and initiate the treatment with miltefosine for positive cases. They should monitor the treatment, follow-up of treatment compliance, treatment completion and side effects. They are also responsible for doing or referring the cases for lab tests required for monitoring any side effects of drugs. In addition, PHC has the responsibility of monitoring the KA related activities carried out by SHP and HP under their jurisdiction.

Since level III health institution has more responsibility on Kala-azar elimination program, the district, region or center should monitor their following activities:

- Diagnostic tests
- Other laboratory tests, i.e. electrolytes, RFT, LFT, complete blood counts, ECG.
- Treatment with first line and second line drug and follow up of treatment.

- Management of adverse effects of drugs
- Referral of PKDL cases to special referral center
- Disease surveillance and recording and reporting
- Line listing of patients

## **Review and Evaluation**

The performance review of Kala-azar elimination program should be planned at each level of health system. At the treatment centre level, a monthly review meeting should be organized together with the review of other public health programs. DHO/ DPHO chief and program focal person should attend and facilitate this meeting. Suspected case referral, contact identification and referral, treatment compliance and completeness and overall progress on KA elimination should be discussed during the monthly review of performances at health post level.

The district should organize quarterly review meeting at district level with participation from community level health facilities. The issues, challenges, constraints and operational problems should be discussed during the meeting. Problems that can be solved without further assistance from the district or center at local level should be identified. These problems and improvement plan should be communicated at the same meeting. District level and national level issues should be further discussed at program managers meeting organized in every quarter and appropriate solutions should be implemented as early as possible.

The national coordination committee evaluates the achievement once a year whereas an international review committee would verify the achievement of the program once the country claims of achieving the elimination goal.

## **Recording and Reporting**

It is necessary to establish a system of regular reporting, analysis, review and feedback of information to make the disease surveillance more effective. Recording, regular reporting and exchange of information should be done upwards, downwards and laterally in the system to develop a common understanding of the problems. The program related data should be compiled at each level of health institution. Feedback is required and it is a part of supportive supervision that is a critical element of the elimination program. It should be linked to surveillance. Surveillance should also be used for sharing of reports periodically to higher authorities on a regular basis to facilitate and rationalize the planning of elimination program. Since surveillance is useful in planning indoor residual spraying through mapping of the areas to be sprayed and in monitoring the trends of Kala-azar. In the KA elimination program, the reporting system thus comprises of mapping and identification of reporting units, development of reporting formats, and regular transmission of data, analysis of data, review and feedback.

Since there is no system of intra-district notification, it is necessary to know the disease incidence rate of particular district. It gives better understanding of the foci of KA communities in these districts. If we have the detail history of individual patients, it helps trace out the case in terms of getting idea of the place where the patient acquired the infection- indigenous or imported. Thus, the scattered cases in several wards of a VDC do not suggest clustering and it is difficult to track an 'index' case.

### **9.1 Reporting Units**

The PHC and hospitals providing diagnostic and treatment service are identified as the reporting unit for KA elimination program health posts and sub-health posts are also identified as sub-unit for reporting about KA elimination activities and they should report the district about their performance of KA elimination related activities. The district health office should also establish a functional system of collecting such reports from the non-government sectors. The data covers information for the preceding month.

### **9.2 Reporting System**

Each reporting unit should compile the reports of HP including its own report and then send a consolidated report of KA and PKDL to the district by 10<sup>th</sup> of every month. Hospitals should compile the data for indoor and outdoor facility separately. The data is entered manually below the district level. If there are no cases then it should be a zero report. A zero report is as important as a report which enumerates the cases seen. Lack of report does not mean to the conclusion that there was no case. In the district, the information from each reporting unit should be entered onto the computer. The district should also identify hot spots of KA in the district that should be shown in the map, i.e. mapping.

It is advised to use the existing HMIS tools for the purpose of recording and reporting related to KA elimination program however some format of the tools that are given in annex can also be used for additional information. Line listing of the cases should be done in KA case record form. The recording of KA treatment should be included in the prescribed format given in the annex 4. The recording of spraying should be done in monthly reporting and annual reporting format.

### **9.3 Report Review and Feedback**

The vector control assistant, the program focal person of the district in coordination with statistical assistant should provide a regular feedback to reporting units and sub-units based on review of the reports. Review and feedback are important at all level of health institution. All reviews and the supervisory visit reports should be summarized and the reports submitted to the higher level along with the monthly report.

### **9.4 Reporting of Information**

The report should be more detail from the hospitals for indoor patients of KA. This should include the total number of admissions, the total number of cases admitted for KA, the total number of deaths and the total number of deaths due to KA. The report should be categorized according to age (< 1 year, 1-4 years, 5-14 years and 15 years and above) and sex. Information on pregnant women should be included separately in the monthly report. The outcome should be summarized as (a) cured (b) worsened (c) died. Indicate the number of patients who worsened and were referred. The report should indicate the number of cases who used the referral services. The monthly report should indicate the number of cases who completed the treatment and the number of cases who are being treated but have not completed treatment. It is also necessary to indicate the number of patients who were started on treatment but have dropped out.

A detail registration of KA cases allows more dynamism in the system to better understanding or maintaining surveillance for effective action in terms of appropriate and adequate case management with early diagnosis, complete treatment, vector control, follow up of the cases, explore more on non-response or relapse. This also allows better understanding and verification of the several hypotheses in relation to clustering of the cases, specific groups, ethnic or socioeconomic status or further to explore cases from India treating in Nepal. The register provides detail information and its use at health institution level is extremely important. If the register is not available due to some reason, record should be maintained in a separate register by including all information required. Sometimes, there is a possibility of double counts that is usually happened in the hospital cases. Therefore district health office should always check total number of cases compiled from the report of health institutions which do not tally with the cases of the hospital.

## **Partnership and Collaboration**

Social mobilization and partnership building is one of the strategic areas of KA elimination. Since KA is a disease of poverty, health sector alone is inadequate to achieve the goal of elimination. Thus a strong and committed collaboration and partnership between various elements of society, non-governmental sector, academia, research institutions, private sector, media and state actors should be strengthened to achieve the goal of elimination and sustain it.

The programme has been collaborating and partnering with WHO, BPKIHS, Institute of Medicine and PATH. BP Koirala Institute of Health Sciences (BPKIHS), an academia, has been serving as the referral centre for KA/PKDL case diagnosis and treatment services, complication management and clinical trials of anti KA drugs including pharmacovigilance. The institute has conducted operational and epidemiological studies on KA. Some of these studies have had policy implications in KA elimination programme. The institute also conducts KA outreach programmes like active case detection and awareness activities in endemic districts.

The community medicine department of Maharajgunj Medical Campus, Institute of Medicine has also collaborated in carrying out various studies on KA. The institute's teaching hospital provides tertiary care level services on KA, especially diagnosis and treatment. However, there are rooms for further collaborative activities to strengthen the programme. PATH, an INGO, has more recently joined hands with the programme in strengthening pharmacovigilance and capacity building.

Other organizations and individuals have also collaborated with programme in carrying out researches supported by WHO-TDR programme.

### **10.1 Partnership and collaboration with other vector borne diseases**

Partnering and forging collaboration with other vector borne disease control programmes and activities can enhance and accelerate KA elimination. The areas of collaboration between these programmes and activities can be vector control, awareness raising, social mobilization, environmental interventions, and behavior change communications. So the KA elimination programme should build and strengthen collaboration and partnership with programmes like malaria control, lymphatic filariasis elimination, dengue control, JE control and other vector borne disease control programmes. Vector control activities like LLIN distribution, indoor residual spraying, and environmental cleanliness targeted for one disease have profound impact on controlling other vector borne diseases.

### **10.2 Partnership and collaboration with academia and research institutions**

Researches are integral part of the programme as they are required to strengthen the programme. Programme evaluations, epidemiological and operational researches, vector surveys, clinical trials, studies on drug efficacy, adverse reactions and resistance done in the past have helped the programme in revising programme guidelines and strategies and to introduce new drugs.

Some academic institutions (medical colleges) have played commendable roles in KA elimination activities including researches, human resource trainings, hospital and community based case detection and treatment, awareness and social mobilization.

### **10.3 Partnership and collaboration with other public health programmes**

Fostering partnership and collaboration with other public health programmes can have mutual and synergistic benefit. One example can be collaboration with leprosy programme. As leprosy skin patches and PKDL have similar presentations, collaboration between these two programmes can share mutual benefit. Leprosy clinics or hospitals of KA endemic districts can support the KA programme by screening skin patches for PKDL cases. Similarly, during active cases detection activities carried out for KA and PKDL cases can screen for leprosy. In the past, KA rapid diagnostic test kits (rK39) were provided to one of the Leprosy Referral hospitals of KA endemic districts and leprosy cases were also screened for and detected during active case detection activity in three KA endemic districts.

### **10.4 Partnership and collaboration with private sector**

The growing private health sector, including medical college hospitals in the country, the programme also needs to work with them to strengthen KA elimination activities. Though these private hospitals are located in urban areas, and are inaccessible to KA patients in terms of both affordability and availability, both sides (programme and private sector) can utilize this as an opportunity to serve this unfortunate community (KA patients). The programme should explore the possibilities to work together to deliver KA services. One of the areas to work together is to provide diagnostic kits and anti KA medicines to these hospitals and increase the service availability.

### **10.5 Partnership and collaboration with other government and non-government sectors**

As KA is a neglected disease and a disease of poverty, inter-sectoral collaboration is very important to achieve and sustain the elimination level. The social and economic determinants of KA need to be addressed through a broader collaboration and coordination with other sectors like local development, agriculture, education, environment and others. Improving the housing is one of the areas where the programme and collaboration need to address to achieve the goals of elimination and sustain in long term.

Local governments (DDCs/VDCs/Municipalities), local clubs, community based organizations, civil societies, households and individuals can play very important roles in achieving the goal of KA elimination and sustain the gains in long term. Their roles can be, but are not limited to, timely presentation to health services for diagnosis, complying with treatment, raising awareness, behavior change, vector control, social audit and monitoring and others.

## Sample Collection and Diagnosis of Kala-azar

### A. Procedure for Testing, Interpretation of the Result and Storage of Test Kits (rK39)

#### *Points to remember:*

- The test should be performed as per the manufacturer's instructions.
- It is preferred that the tests should be performed in serum as opposed to whole blood.
- The vial or the pouch of the test kits should be checked for expiry date to ensure that the test strips have not expired.
- The strip should be taken out from the vial or the pouch only at the time of performing the test.
- If the strip has not been used within one hour of taking out from the vial or the pouch, it should be discarded.

#### *Procedure:*

- Remove the test strip from the pouch or the vial.
- With a new lancet, prick the fingertip of the patient suspected to be suffering from Kala-azar. Lancets should not be re-used because of the risk of transmitting HIV and Hepatitis B and C.
- Let the blood come out on its own. Do not use pressure or squeezing for obtaining blood.
- Place one drop of blood or serum (as indicated in the manufacturer information sheet) on the absorbent pad of the strip bottom.
- Place the test strip into a test tube so that the end of the strip is facing downwards. This would encourage the blood to migrate upwards by capillary action. Follow the recommendations made by the manufacturer to obtain the best results.
- Add 2-3 drops of buffer solution provided with the kit to the pad.
- Read the results in 10 minutes. Do not read the results before or after 10 minutes. If the time period of 10 minutes is not adhered to there are chances of mistake being made.

#### *Interpretation of the results:*

The rK39 test stays positive in the patients who had KA infection for a long time after the treatment. The dipstick test can be positive in healthy persons from endemic areas who are infected with leishmania but not sick. Therefore the test should be performed only in a clinically suspected case of KA, who has a first-time episode.

#### **Positive result:**

The test is positive if both the control and test lines appear. A faint red line is to be considered as a positive result.

A red line appears in the control line where the blood/serum was placed and another red line appears where the blood has migrated through capillary action. The red line appears in the control line a little distance away from where the blood/serum was placed. Thus there should be two red lines for the test to be positive.

#### **Negative result:**

The test is considered as negative if there is a red line where the drop of blood was placed but there is no red line where the blood has migrated by capillary action at the end of 10 minutes.

#### **Invalid result:**

The test is considered as invalid if no control line appears whether the test line appears or not. There is no red line at the place where the drop of blood was placed or in the test area where the blood is

to migrate by capillary action. The test is also invalid if there is a red line in the test area but no red line in the control area where the blood was initially placed. If the test is invalid, a fresh sample with a new strip is recommended for retesting for which the correct procedures should be strictly followed.

### ***Storage of rK39 test Strips:***

- The test strips and the buffer should be stored safely at room temperature between 20 and 30 degrees Celsius since the temperature in excess of 30 degrees can reduce the quality of the test.
- The test strips and the buffer should not be frozen since freezing deteriorates the quality of the reagent.

**Note:** It is not advisable to store large quantities of 'rK39' test kits in the peripheral locations since it is difficult to maintain appropriate temperature. However, the test kits can be stored for a long time in identified central locations in the districts where the temperature can be properly maintained as required in the specifications. These locations should serve as the supply points for the peripheral units. The supplies can be made once in a month or when health workers come for a review meeting.

## **B. Bone Marrow Aspiration**

The bone marrow aspiration is done by a bone marrow puncture. The sites for bone marrow aspiration are manubrium sterni, iliac crest or tibia. The most common site is sternum. Before doing the procedure, blood should be checked to make sure that there is no bleeding or clotting disorder. This can be done by the estimation of platelet count and determination of prothrombin time. If these are abnormal then bone marrow aspiration should not be done until the tests are within safe limits. The test should be avoided in severely anemic patients.

### ***Procedure:***

- Ask the patient to lie down on the back.
- As a part of the preparation of the site, shave the hair and clean the part thoroughly with savon.
- Give an injection of local anesthetic as a 2 percent solution at the aspiration site as the injection is made prior to the procedure.
- Check to make sure that the sensations are blunted.
- The aspiration is done with a sterilized sternal puncture needle which is short and stout with a well-fitting stylette to make sure that the needle does not pierce too deep.
- Once the needle has pierced the periosteum, there is a feeling of loss of resistance needed to push the needle. At this point a negative suction should be done to suck the bone marrow out.
- The needle is then withdrawn carefully and the material sucked put into a sterile tube.
- In contrast to the splenic aspirate, the bone marrow has blood mixed with the bone marrow. One drop of the material aspirated should be placed on a glass slide about 1 cm from the edge of the slide.
- With a micropipette or by a filter paper, the blood should be sucked out by the filter paper. This is because the presence of blood can interfere with identification of LD bodies.
- Use the edge of another slide as a spreader to make a thin smear of the bone marrow. While making a thin slide, make sure to prepare a trail of marrow cells.

## **C. Splenic Aspiration**

Before doing the splenic aspiration, it is important to make sure that the patient does not have a bleeding or clotting disorder. This can be ensured by doing platelet and prothrombin time estimations and assessments of bleeding time and clotting time. If these are abnormal then the splenic aspiration should not be done. If the patient has a local infection at the site where the



aspiration is planned, the test should not be done until the infection has been treated. Do not perform a splenic puncture if the patient is severely anaemic.

**Procedure**

- Clean the skin at aspiration site thoroughly the same way as for a surgical procedure. It should be dry when the aspiration is done.
- Use a 5 ml syringe and 21-gauge needle for the procedure.
- Withdraw the plunger of the syringe about 1 ml to create negative suction.
- Pierce the skin and puncture the spleen by pushing the needle deep. Maintain the suction all the way while injecting and withdrawing so as to maintain a negative suction.
- Coordinate the procedure such that the diaphragm does not move while the procedure is being carried out. The procedure becomes difficult in young children who may not keep still during the procedure.
- Expel part of the material sucked on the side of a sterile culture tube, label the culture tube and transport it to the microbiology laboratory for examination.
- The other part of the material sucked should be placed on a clean slide about 1 cm from the edge and a thin smear made of the aspirate.
- After the procedure, keep the patient under close observation.
- Observe the pulse, respiratory rate and measure the blood pressure every half an hour for any complications.
- The patient should be kept under observation for a period of 12 hours after the procedure.

**D. Microscopy of Tissue Aspirates for *Leishmania donovani***

The slides collected should be labeled to facilitate the identification of the patient. Write the patient’s name, identification number and the date on which the slide was prepared. Each slide should be fixed before staining. This can be done by dipping the slide in methyl alcohol for 20 minutes. The slides can be stained by using Leishman’s stain or Geimsa’s stain. These stains are available commercially but can also be prepared locally. It is preferable to use commercially available stains since there can be variations in quality if each laboratory prepares its own stains.

The air-dried slides or properly fixed slides should be transferred to a jar containing Geimsa’s stain diluted with 15-20 volumes of buffer. The slides then should be kept upright to dry and allow the stain to dry out. If Leishman’s stain is used, the slide should be kept horizontally on a slide rack or on a tray with the help of two glass rods using them as a support. After placement, the slide is flooded with the stain for about 30-60 seconds and then by adding double the volume of water. After this, the slide should be allowed to stain for a period of about 5-7 minutes. The slide should then be washed in a stream of buffered water until it acquires a pinkish tinge. After this, the slide should be kept vertically to dry out. The stained slides should be examined for LD bodies under a good quality microscope with 10 x eyepiece and 100 x oil immersion lenses.

**Grading of parasite density:**

Grade	Average parasite density
6 plus	More than 100 parasites/field
5 plus	10-100 parasites/field
4 plus	1-10 parasites /field
3 plus	1-10 parasites/10 fields
2 plus	1-10 parasites/100 fields
1 plus	1-10 parasites/1000 fields
0	0 parasites/1000 fields

## SOPs for Different ACD Methods

To accelerate the elimination program in the district, success of active case detection is important. This approach will help facilitate early detection and prompt treatment. The district health/public health office in coordination with the health institutions from where passive cases are reported should be responsible for planning and implementation of active case detection. The standard protocol for active case detection of KA and PKDL cases is given below:

### A. Index Case Based Approach

**Policy/scope:** This approach is to be implemented in low KA endemic areas (to be defined in each country) on an ongoing basis throughout the year in communities with newly detected KA cases.

**General responsibilities:** The District Public/Health Officer is responsible for implementing the activity.

**Materials required:** 1) Work diary; 2) Patient register; 3) Patient Referral slips; 4) Training manual; 5) Household screening register; 6) Kala azar treatment card; 7) Drug distribution register

### Procedures

#### Preparatory activities at district level

1. Identify villages where the index case approach will be applied.
2. Identify and train public health workers/health volunteers in identification and referral of chronic fever cases.
3. Identify staff at DPHO/DHO responsible for conducting index case search of neighbourhood.
4. Define information sources of index cases – e.g. monthly review meetings at district etc.
5. Ensure availability of drugs, rk39 test kits, fund requirements, IEC material, treatment cards etc. at the district.
6. Prepare plan for supervision and M&E of index case based approach – identify supervision team for supervision activities on a sample basis.
7. Define reporting system from health facility to district.

#### Preparatory activities at health post level

8. Identify and train health workers/health volunteers in identification and referral of chronic fever cases, skin lesion cases (suspected PKDL).
9. Identify staff/health volunteers responsible for conducting index case based search of neighbourhood.

#### Index case based search activities

1. Monthly review of all KA cases reported by zonal/district hospital from the district.
2. List KA patients – name, age, sex and detailed address of patient, name of health post responsible for index case search.
3. Health post staff visits the community of the index case, traces the home, confirms identity of the patient and alerts the health worker/health volunteer.
4. Organize house to house search around index case in the same month of reporting of index case using screening forms or format or register.
5. Screen all individuals for fever  $\geq 2$  weeks in neighbouring households in the village/hamlet around the house of index case done by HP staff and health worker/health volunteer.
6. Fill patient referral form and refer cases to district/zonal hospital for confirmation of Kala-azar.
7. Maintain a list of cases referred for confirmation of KA diagnosis.
8. Inform district/zonal hospital staff of cases referred for KA diagnosis.  
Maintain records and report to district on index case finding activities conducted.

### **Post index case based search activities at district/zonal hospitals**

1. Ascertain diagnosis of all cases referred by health workers after index case based search.
2. Ensure that all Kala-azar cases are started on treatment.
3. Monitor treatment compliance and side effects.
4. Ensure timely payment of wage-loss to Kala-azar/PKDL patients.
5. Ensure timely payment of incentives to Female Community Health Volunteer for case follow up.
6. Ensure availability of drugs and diagnostics at hospitals based on number of Kala-azar cases.

### **Post index case based search activities at district level**

1. Assess monthly reports on number of Kala-azar cases, drug distribution.
2. Supply of drugs and diagnostics based on number of Kala-azar cases reported.
3. Evaluate index case finding activities based on supervision/monitoring reports.

### **Post index case based search activities at health post level**

1. Inform public health workers of cases diagnosed and started with KA/PKDL treatment to ensure treatment compliance or for any side effects/adverse events.

## **B. Camp Approach**

**Policy/scope:** The camp approach is to be implemented in Kala-azar high endemic areas. The camp approach ideally is to be implemented twice a year.

**General responsibilities:** The District Public/Health Officer is responsible for implementing the camp approach strategies.

**Materials required:** 1) rK39 kits in a cool box for transport; 2) Lancet & Lancet disposal box; 3) Cotton; 4) Spirit; 5) Gloves; 6) General medicines – anti-pyretics, antibiotics, anti-diarrheal, anti-malarial drugs etc.; 7) Rapid diagnostic kits for malaria (optional in malaria endemic areas) and other diseases, if available; 8) Patient referral form; 9) Lab investigation form; 10) Camp register (Register book); 11) Photo album of PKDL; 12) VL/PKDL patient registration form; 13) IEC materials, banners, posters, pamphlets (local language), pictures of PKDL skin lesions; 14) Mikes; 15) BP apparatus; 16) Thermometer; 17) Stethoscope; 18) Disposable syringes, IV infusion sets etc. (optional); 19) Transport box for drugs, supplies etc.; 20) Emergency drugs – cortisone, anti-histamines, IV fluids, adrenaline; 21) Bio-waste disposal containers; 22) Equipment for starting treatment (optional in areas where treatment will be started in the camp)

### **Procedures**

#### **Pre-camp preparatory activities at district level**

1. List the villages with high Kala-azar incidence (new cases reported).
2. Conduct a meeting with DP/HO to prepare a micro-action plan at least 1 month before initiation of camps.
3. Prepare a time schedule for camps – decide number of camps, timings, duration of each camp, list name of villages where camps are to be held etc.
4. Prepare logistics plan – estimate requirement of drugs, rk39 test kits, lancets, gloves, fund requirements, IEC material etc.
5. Prepare supervision and monitoring plan for camps – identify supervision team, supervision schedule etc (on a sample basis).

#### **Pre-camp preparatory activities at district level**

1. DPHO/DHO staff meeting to plan camp activities at least 2 weeks before initiation of camps.
2. Identify the DPHO/DHO team (medical officer, nurse, lab technician, health inspector, etc) which will conduct/coordinate camp activities.

3. Define duration of camp (usually one day camp).
4. Prepare plan for camp logistics – drugs, diagnostics etc.
5. Arrange/provide refreshments for camp team on the day of camp.
6. Vehicle requirement.
7. Identify and coordinate with village level functionaries/leaders.

#### **Pre-camp preparatory activities (village level)**

- 8 One HP staff (nurse, lab technician, health inspectors or other) conducts coordination meeting at least 1 week before camp with community leaders/members and others to inform and solicit community involvement in publicity and conduct of camp activities.
- 9 Identify venue for camp and determine its suitability for conducting camp.
- 10 Identify, train and assign roles to village functionaries/volunteers / religious leaders/school teachers for camp publicity activities.
- 11 Publicity activities to include miking, public announcement, distribution of pamphlets, putting up of banners/posters in public places, announcement on local FM radio, interpersonal communication by health workers etc.
- 12 Publicity activities to be conducted at least one day prior to camp and on the day of camp.
- 13 List and manage locally camp furniture (tables, chairs, bench, examination table, bedside screens), drinking water provision etc.
- 14 Set up camp one day prior or early morning of the camp day (e.g. through local volunteers).

#### **Camp day activities**

1. Camp Team: one MO, one lab technician, one nurse, NGO/ community volunteers/school teachers etc.
2. Organize flow of camp activities.
3. Patient registration (name, address, age and sex).
4. Examination of patient for fever  $\geq 2$  weeks by MO, past history of kala azar, spleen examination, general examination, examination for skin lesions.
5. rk39 test to be done by lab technician at camp if fever  $\geq 2$  weeks and splenomegaly.
6. If rk39 test positive, Case Referral form to be filled and given to patient. Case referral register to be completed.
7. Kala azar treatment card filled for rk39 positive patients. One copy of treatment card given to patient. Office copy of treatment card archived in district hospital.
8. For suspected PKDL patients (PKDL-like skin lesions with rk39 test positive and past history of kala azar treatment) will be referred to district/appropriate level hospital for confirmation of diagnosis and treatment start.
9. Drug distribution register maintained.
10. If rk39 test negative or for all other patients, MO advises appropriate treatment/refers for further diagnostic tests. Particular emphasis may be given to suspected leprosy patients.
11. All patients with severe Kala-azar and or other co-infections to be referred to appropriate level hospital.
12. Proper disposal of bio-waste at the end of the camp.

#### **Post camp activities at district level**

1. Maintain camp records - camp registers, treatment cards, referral register, drug distribution register.
2. Manage patient specific drug box for Kala-azar patients.
3. Ensure that patients referred from camp or patients started on KA treatment follow up regularly for further treatment.
4. Ensure timely payment of wage-loss monies to Kala-azar patients

5. Assessment of camps - Number of attendees, number of chronic fever cases, number of rk39 tests done, number of rk39 test positives, number of patients started treatment for kala azar/PKDL, number of patients referred for KA/PKDL treatment and follow up, drug distribution.
6. Assessment of constraints, difficulties of conducting camp.
7. Submit camp activity reports to district.
8. Supply of drugs and diagnostics based on number of VL/PKDL cases reported.
9. Evaluate camp activities based on supervision/monitoring reports.

#### **Post camp activities at village level**

1. Inform health workers of patients diagnosed and started with KA/ PKDL treatment to ensure treatment compliance or for any side effects/adverse events.

**Note:** As PKDL is one of the differential diagnoses of leprosy, all suspected PKDL cases should be ruled out for leprosy. During camp activities health workers who can screen leprosy should be mobilized. Leprosy programme people should be informed of this activity and at district level, district TB and leprosy officer (DTLO) is the appropriate person to coordinate leprosy screening in these camps.

### **C. Incentive Based Approach**

**Policy/scope:** The incentive approach is to be implemented in low Kala-azar endemic areas (to be defined in each country) and is implemented on an ongoing basis throughout the year in communities with newly detected Kala-azar/PKDL cases.

**General responsibilities:** The District Public/Health Officer is responsible for implementing the incentive based case detection strategies.

**Materials required:** 1) Work diary; 2) Patient register; 3) Patient Referral slips; 4) Training manual, Pictures of PKDL skin lesions

#### **Procedures:**

##### **Preparatory activities at district level**

1. Identify villages where the incentive approach will be applied based on endemicity.
2. Identify and train health workers/health volunteers in identification and referral of chronic fever cases.
3. Ensure availability of drugs, rk39 test kits, fund requirements, IEC material, treatment cards etc. at the district.
4. Prepare plan for supervision and M&E of incentive approach - identify supervision team for supervision activities on a sample basis, and based on the report of the cases in the district hospital.
5. Define reporting system from health post to the DPHO/DHO.
6. Manage fund for providing incentive.

##### **Preparatory activities at health post level**

1. Identify and train health workers/health volunteers in identification and referral of chronic fever cases, skin lesions.

##### **Incentive based search activities**

1. Screen individuals for fever  $\geq 2$  weeks in the village/hamlet.
2. Fill patient referral form and refer patients to nearest PHC /district/zonal hospital for confirmation of Kala-azar.
3. Maintain a list of patients referred for confirmation of KA diagnosis.
4. Inform PHC/health post staff of patients referred for KA diagnosis.

**Post incentive based search activities at health post level**

1. Ascertain diagnosis of all patients at the district hospital referred by health workers.
2. Ensure that all Kala-azar patients are put on treatment.
3. Monitor treatment compliance and side effects.
4. Maintain records and report to district about case finding.
5. Ensure availability of drugs and diagnostics at District Hospital based on number of Kala-azar/PKDL cases.

**Post incentive based search activities at district level**

1. Assess monthly reports from health facility - Number of kala azar/PKDL cases, drug distribution.
2. Supply of drugs and diagnostics based on number of Kala-azar/PKDL cases.
3. Evaluate incentive based case search activities based on passively reported cases in the district hospital.

**Post incentive based search activities at health post level**

1. Inform health workers/health volunteers about the patients diagnosed and started with Kala-azar/PKDL treatment to ensure treatment compliance or for any side effects/adverse events.

**Investigation Form for ACD**

*(To be used by the team mobilized for active case detection)*

1. District:
2. VDC/Municipality:
3. Ward No.:
4. Village/Tole/Street:
5. Name of the person suspected for Kala-azar:
6. Ethnic Group:
7. Age (in years):
8. Sex:
9. Name of the head of the household:
10. Relation with the suspected case:
11. For how many days have you (or the child) had fever? ... .. Days
12. Have you (or the child) lived out of the village during the last four months? (a) Yes  (b) No
13. If yes,  
(a) Is it in the same district   
(b) Is it in another district   
(c) Is outside the country ... ..
14. Have you (or the child) ever been treated in the past for Kala-azar? (a) Yes (b) No
15. Date and Time of rK39 test performed: ... ..
16. Result of rK39 test: (a) Positive  (b) Negative
17. If the rK39 test is positive, the patient referred to ... ..
18. Referred by:  
Name: Designation:  
Health Institution: Date:

**Note:** *The district public health office should maintain the record into the computer, according to the above given information of each positive case. This record will be used as the basis for patient follow up and link it with the treatment data base. Besides, it will be useful to mapping the clusters of cases that will guide educational and vector control related activities*

## Vector Surveillance and Indoor Residual Spraying

The following methods are recommended to be integrated into routine vector surveillance:

### A. Monitoring of Vector Density

Vector density is measured in six interventions and six sentinel/control houses in each village two to four weeks before spraying as well as two to four weeks and three to four months after spraying, using Centers for Disease Control and Prevention (CDC) light traps for one night. The density in sprayed houses is compared to sentinel and/or control HHs. Sentinel houses are houses in IRS villages in which families are requested not to spray their houses for a short period but in the interim are provided with non-impregnated mosquito nets for personal protection (WHO, 2006). Given the ethical concerns of not spraying, locked houses or those for which the owners themselves have refused permission to spray insecticide may be used as sentinel houses. The monitoring of vector densities in sentinel houses shows the mass effect of IRS on the vector population. Control houses are the houses in neighbouring villages which have not been sprayed. Comparison of vector densities in intervention houses and control houses over time allows identification of seasonal or social effects (e.g. lime plastering) on sandfly densities which interfere with the spray effect.

CDC light trap set-up and collection is carried out by trained insect collectors supervised by the entomologist. The CDC light traps are set up 15 cm away from the wall and 5 cm above the ground in one corner of the main bedroom of a household. The same room and position is used for subsequent surveys. Sandflies are collected from sunset to sunrise on one night. On the collection night, HH members can use the room as usual but should be requested not to use electric light bulbs, mosquito repellants or mosquito coils.

Sandflies collected in light traps are transferred to the laboratory. Sandflies are separated from other insects and according to species. A binocular microscope is used to identify the species, number and gender of all sandflies as well as the physical status of female *P. argentipes* are preserved separately in 80% alcohol or mounted on Berlese media.

Morphological identification uses the criteria listed below.

1. Species:
  - a. *P. argentipes* (Pa): black thorax, silvery shine on tarsal tip of the leg, 3 mm long;
  - b. *P. papatasi* (Pp): brown body, 3 mm long;
  - c. *Sergentomyia* spp (Sr): colour varies from dark brown to dark grey, 1–2 mm long.
2. Sex and physiological status:
  - a. males: external genitalia with claspers
  - b. females: without claspers
  - c. unfed, blood fed, gravid (no undigested blood).

### Man landing catches

For this method, trained persons should work in pairs and catch the sandflies that come to humans to bite over a certain period (shift) during the night time. The numbers caught per hour per person is the man-landing rate. Because of the risk of contracting leishmaniasis skilled personnel should be utilised for this collection technique and sandflies should not be allowed to actually bite. In addition, collectors should wear protective clothing. Owing to human variation; some collectors will always be more efficient and/or more attractive than others. Such factors should be taken into account when measuring patterns of sand fly biting activity over time.

### Endophilic resting collections

Trained vector collectors can search for indoor resting sandflies in households on a regular basis and in a systematic way ensuring that all walls and crevices on each wall are searched. Alternatively indoor resting collections can be conducted by means of a “Knock down catch” when a fast acting pyrethroid insecticide can be sprayed into a room after covering the floor with a clean white sheet. This method allows the number of sandflies knocked down per room or house to be assessed. Regular monitoring in such a way can monitor the impact of IRS on resting densities in targeted areas. This method ensures larger catches than use of sticky traps; however, there may be some residual effects from the pyrethroid spray, and this needs to be allowed to dissipate before repeat collections can be made, to avoid confounding with regards to future monitoring of sandfly resting densities.

### Trapping by interception and attraction

In principle, interception traps sample active sand flies in a given habitat/ecotype, without bias, during a set time period. Use of sticky traps is one low tech method of sampling sandflies by interception. Standardized paper or cards 25 x 20 cm's are soaked in castor oil and placed in places where sandflies are likely to be active at night. Rows of traps hung at floor or ceiling level can be used to sample intra-domiciliary activity of sandflies. Collected sand flies can be removed with a brush, washed with saline with a little bit of soap solution and then counted. The results can be expressed as number of sand flies caught per square meter per night.

CDC Light traps can be used as a way of attracting sand flies. This is a non-labour intensive method of collecting active sand flies over a whole night. The distance at which these traps are attractive to sand flies is relatively small and therefore numerous light traps may be required in any one given sampling foci.

**Table: WHO recommended methods for sandfly surveillance**

<i>Vector control method</i>	<i>Entomological parameter</i>	<i>Collection type</i>	<i>Monitoring type</i>
Indoor Residual spray	Day time indoor resting	Endophilic Resting Collections, Knock Down Catches	Regular
	Human biting rate	Man Landing Collections	Trend
	Parous rate	Endophilic Resting Collections, Knock down Catches, Man Landing Collections	Trend
	Insecticide susceptibility testing	WHO Susceptibility Test-Kits	Regular
	Adult sand fly density	Man Landing Collections, CDC Light Trap Collections, Sticky Trap Collections	Trend
Insecticide treated nets	Biting in relation to sleeping habits	Man Landing Collections	Specific purpose
	Adult mosquito density	As Above	Trend



## **B. Bio-efficacy of Insecticide on Sprayed Surfaces (Bioassay)**

Bioassays are performed to measure the efficacy of IRS two to four weeks and again five months after spraying in the houses in which light traps are fixed. These are carried out independently by insect collectors/entomologists not involved in spraying operations, supervised by an entomologist. Six HHs in each of six villages (wards) in each district are selected for residual activity measurement by bioassay (WHO 2006). Bioassay tests are performed by exposing non-fed susceptible female sandflies for a period of 30 minutes. Ten sandflies (collected by aspirators or originating from insectariums) are introduced into each WHO plastic cone fixed on the insecticide-treated surfaces. There are four replications of the test on treated walls (four sides of the room) in each of the six selected houses and one test on an untreated wall, to act as a control. After exposure, the females are placed in 150 ml plastic cups (10 individuals per cup) with sucrose solution provided and maintained in a climatic chamber for 24 hours at 27°C ±2° C and 80% ±10% relative humidity (RH). Percentage of knockdown after 60 minutes and percentage mortality after 24 hours are recorded. Results are pooled for analysis.

## **C. Monitoring of Insecticides Resistance**

Vector resistance to insecticides results from the repeated use of the same insecticide or insecticides that form part of the same chemical group (e.g. pyrethroids). This provides increased selection pressure in wild populations, to adopt physiological/biochemical changes after contact exposure with the insecticide so it is no longer affected by it. It is therefore imperative to introduce regular insecticide susceptibility testing of *Phelbotomus argentipes*, following WHO standardised protocols so as to monitor insecticide resistance patterns in Kala-azar endemic areas where IRS is deployed but also in areas where insecticides are also used for agricultural use. Monitoring of insecticide resistance will allow an evidence base in which to appropriately select insecticides in combination with national policy, cost and availability. To date, few tests on the susceptibility of *Phelbotomus argentipes* to insecticides have been carried out in the South-East Asia Region. What little work has been done indicates that this species is susceptible to the insecticide DDT, with a slight increase in tolerance over many years of use.

### **Insecticide susceptibility (WHO standard chamber method)**

The WHO standard chamber method is used to test insecticide susceptibility to the insecticide used by the country concerned. Wild caught, non-blood-fed nongravid female *P. argentipes* are introduced into WHO susceptibility chambers (lined with the insecticide impregnated paper) for a period of one hour. Batches of no more than 20 sandflies are introduced into each chamber in order to minimize the chances of disturbing each other during the exposure. For each insecticide/concentration, 5 replicates and 1 control of 20 *P. argentipes* are tested.

Results are pooled for analysis. After exposure, females are taken out and placed in 150 ml paper cups (20 individuals per cup), with sucrose solution provided, and maintained in a climatic chamber for 24 hours at 27±2° C and 80% ±10% RH. Percentage of knock-down after 60 minutes and mortality after 24 hours are recorded.

### **Correction of mortality in bioassay and susceptibility tests**

Test series with control mortality of over 20% are cancelled. Those with control mortality between 5% and 20% test mortality are corrected by Abbott's formula (1925) as follows:

$$P = \frac{P1-C}{100-C} \times 100$$

Where, P = corrected mortality

P1 = % observed mortality

C = % mortality in control

## **D. Spraying Technique**

The suspension should be prepared correctly so that sufficient quantities of the insecticide are sprayed to be effective. Prepare 8 liters of the suspension at a time. This will be sufficient for 6-8 households for Kala-azar and 3-4 households for Malaria. If the village is high endemic for malaria it is advised that the norms for Malaria should be followed. This will also be effective against Kala-azar.

Place the required quantities of wettable powder of insecticide in a 15-liter bucket as per instructions. Add volume of water with a mug that is considered adequate to make a paste. Do not put too much water at this stage. Once the paste is made, then pour water on the paste and keep mixing vigorously to make a uniform suspension. Add measured volume of water. After this procedure, filter the solution through a clean cloth to remove any particulate matter. Any particulate matter will block the nozzle of the spray pump. This will cause difficulty in spraying the surface with the insecticide.

The barrel of the spray pump is placed in the bucket containing the spray suspension. One person operates the pump and the other is responsible for the spray. If a compression pump is used, it can be operated by one person. The spray lance should be kept 45 cm away from the surface to be sprayed. The swath should be parallel. It is applied in a vertical swath about 53 cm wide. There should be an overlap of about 7.5 cm between two swaths. Spraying should be done from the top downwards. The top should be about 6 feet from the ground. The spray should not drip on to the floor.

The deposits on the wall should be uniform and no areas should be skipped. This is an indication of good spray. The supervisor should check the quality of the spray. It takes about 3 minutes to spray about 150 sq meters area. This is the average size of a dwelling in rural areas. There are always some households that are not covered in the first round. These should be covered under subsequent mopping up round on the same day or on a pre-decided different day.

The discharge rate should be 740-850 ml per minute. The person who is responsible for pumping the material should give 20-26 strokes per minute with 10-15 cm plunger movement at a pressure of 10 pounds per square inch. Spraying into a bucket for one minute and measuring the discharge rate per minute helps to ensure that the discharge rate is satisfactory. If the discharge rate exceeds 850 ml minute then the nozzle should be rejected.

A blockage in the nozzle is a frequent problem. The nozzle cap should be removed by unscrewing it and replaced by a new nozzle, which is patent. The blocked nozzle should be kept immersed in water for a few hours and then cleaned with a fine wire.

The unused insecticide should be disposed off safely as per the guideline provided. The buckets that were used should be cleaned properly ensuring safe disposal of the waste to ensure that it does not contaminate the environment.

## **E. Use of Hand Compression Pump**

A hand-compression sprayer consists of a tank for holding a liquid insecticide formulation, which can be pressurized by means of a hand pump attached to it. The compressed air forces the liquid from the tank via a hose with a cut-off valve, a lance and a nozzle. The barrel of the sprayer should be capable of withstanding an internal pressure of 14 kg/cm<sup>2</sup> and for this purpose the metal walls should not be less than 0.63 mm thick. The diameter of the plunger shaft should not be less than 12 mm. The plunger bucket of the pump should be made from nitrile rubber or chrome-tanned leather. The plunger assembly should be easily removable for cleaning and repair in the field. The handle may be shaped D or T. The handle grip should be about 30 mm in diameter. Further, the length in the case of T-type handle should not be less than 20 cm.

Following actions may be ensured by the operators/supervisors:

- The compression sprayer is pressurized before commencing spraying but it is not continuously pumped.
- The pump is filled to levels usually at about  $\frac{3}{4}$  liquid to  $\frac{1}{4}$  air. A smaller air volume in relation to liquid volume would not retain sufficient pressure for long periods.
- When the tank is not in use, the spray lance is held in a bracket and nozzle cup, which protects the nozzle from damage.
- The nozzle tip is the most important part of the sprayer. It should deliver a precise amount of spray suspension per minute (740-850 ml) at a certain pressure (40 PSI or 2.8 kg/cm<sup>2</sup>) in the tank and maintain a uniform spray pattern and swath width (53 cm or 21").
- The flat-fan spray nozzle delivers a fan-shaped spray, and is used for residual wall spraying.
- The flat-fan spray nozzle used for indoor residual spraying which produces a spray with an angle of 60 and 750-840 ml. per minute output at a standard tank pressure of 40 PSI (2.8 kg/m). It is usually made of especially hardened stainless steel. The nozzle tip is designed with flat surfaces on either side of the orifice so that it can be removed easily. The pressure at nozzle tip is calibrated at 10 PSI (0.7 kg/cm).
- The inside tank should be thoroughly cleaned.
- The distribution hose and accessories should be securely attached to the delivery outlet. The cut-off valve should be tightly closed.
- Full strokes to be pumped till the pressure gauge registers 2.8 kg/cm (40 PSI).
- The sprayer must be suspended on the shoulder or carried in hands.

## **F. Routine Maintenance of the Equipment and Minor Repair Work**

The spray equipment is subject to normal wear and tear since the insecticides are corrosive. To reduce the deterioration the following actions should be undertaken at the end of each day:

- The discharge line should be disconnected at the delivery outlet at the end of spraying.
- The bucket and the discharge line should be emptied.
- The spray pump should be thoroughly rinsed with clean water.
- The filter assembly should be rinsed and cleaned.
- Filter should be removed from the valve by grasping it at its screen and slightly twisted on pulling it out.
- Reassemble all the clean parts except the nozzle.
- Put clean water in the tank, seal the tank and pump air into it.
- Open the control valve and let the water flow from the lance to flush the hose, filters, control valve and lance.
- Remove the tank cover and dry the inside of the tank.
- Clean the nozzle tip by washing thoroughly with water.
- Remove any dirt from the orifice with a fine bristle/a brush.
- Never use a wire or nails to clean the nozzle.

### ***Minor Repair of the spraying equipment***

- Cleaning the nozzle
- Cleaning of the discharge line
- Tightening of the hose clamp
- Tightening of the gasket
- Tightening of the nut and compression of the cut off valve
- Replacement of the nozzle.

## **G. Instructions for the Spray Team Members (Do's and Don'ts)**

- A simple leaflet should be provided to each member of the spray team. This should be in simple local language with appropriate illustrations.
- Wash your hands thoroughly with soap and water after preparing the insecticide spray. This is to be repeated every time the spray operation is stopped.
- Washing of hands thoroughly with soap and water is advised when the team takes a lunch or tea break.
- The personal protection comprising of apron, gloves, mask and goggles should be worn during the insecticide spray.
- Avoid direct contact of the insecticides with eyes or skin. If this happens wash the skin coming in contact and adjacent skin thoroughly with soap and water. Eyes should be flushed repeatedly with clean water for a period of at least 5 minutes or 10 times to protect yourself against any harmful effects of the insecticides.
- If irritation persists even after thorough washing, seek medical advice.
- If any member of the spray team suffers from any symptoms while the spraying operations are ongoing, medical attention should be sought without any delay.

## Kala-azar Surveillance Formats

<b>Kala-azar Elimination Program, Nepal Patient's Treatment Card</b>			
Patient's Name:	Age: (years)	Sex:	
Address:	District:	VDC/Municipality:	
Ward No.	Village/Tole/Street:		
Referred by:	(Health Institution)		
Diagnosed by:	(Diagnostic test)		
Date of diagnosis:			
Diagnosed in:	(Health Institution)		
Treatment by:	(Doctor's name)		
Treatment initiated by:	(Health Institution)		
Follow-up by:	(HW's name)		
Registration No:	Seal of the Health Institution		

Days	Drug/Dose	Adverse Drug Reactions	Date of onset of ADR	ADR reported by (Health worker's name)	Contact of ADR reporting person	Remarks





## Automatically Calculated Kala-azar Monthly Reporting Form

District:			Month:					Year:							
Population	VDC	Total affected VDCs	New affected VDCs (Cumulative since January)	% new cases/all cases	Cumulative cases of VL since January	Cumulative cases per 10,000 people since January	% Vulnerable cases / Total cases	Cumulative cases PKDL since January	Initial treatment outcome (Cumulative)			ACD (cumulative)			
									Initial			Planned	Done	% ACD planned	
									% Cured	% Died	% Interrupted/Defaulted/Referred				



### Indicators to be calculated at the end of the year

Month: _____ Year: _____																	
District	Population	VDC	Total affected villages	New affected villages (Cumulative since Jan.)	% new cases/all cases	Cumulative cases of VL since Jan.	Cumulative cases per 10,000 people since Jan.	% Vulnerable cases / Total cases	Cumulative cases PKDL since Jan.	Initial treatment outcome (Cumulative)			ACD (cumulative)		#villages sprayed	IRS coverage of targeted villages	
										Initial			Planned	Done			% Fever camps of planned
										% Cured	% Died	% Interrupted/Defaulted/Referred					

## Data Collection Form after the End of the Spraying Cycle at the District Level

Supplies	To be entered	Indicator calculated automatically	Auto generated
#pumps available		% functional pumps available	
#functional pumps			
#PPE for how many squads?		% of squads with protective clothing	
Insecticide available(tons, kg or sachets)		% quantity of insecticide received that was requested	
Insecticide needed/requested (tons, kg or sachets)			
<b>Human resources &amp; training</b>			
#squads hired		% of needed squads actually hired	
#squads needed/requested			
#squads trained before start of cycle		% of squads trained before start of cycle	
#villages supervised for IRS		% IRS villages supervised	
#villages sprayed			
#squads with quality score*		% squads with acceptable quality	
#squads observed			
<b>Achievement of targets</b>			
#PHCS targeted for IRS		% of targeted PHCs sprayed	
#PHCS sprayed			
#villages with KA in last 3 years <sup>b</sup>		% KA villages targeted for IRS	
#villages targeted for IRS		% KA targeted villages sprayed	
#Villages sprayed			
#HHs targeted for IRS		% of target HHs sprayed	
#HHs sprayed			
<b>HOUSEHOLD SURVEY<sup>+</sup></b>			
#households interviewed			
#HH who received adequate information		% HH with adequate information	
#HH reporting to have been sprayed		% HH covered by IRS	
#HH satisfied		% HH satisfied	

## Sandfly Collection Record Sheet

Name of VDC:

Name of village:

Name of Cluster:

**Code:** --S -

village (1,2,3,4) - collection method ( C = CDC Light Trap)-number of the survey (S0, S1,S2, S3) - house number (01-35)

**Date:** // dd/mm/yy

Signature:.....

Sandfly	Males	Females			Total
		Unfed	Fed	Gravid	
<i>P.argentipes</i>					
<i>P.papatasi</i>					
<i>Sergentomyia</i>					

.....  
Name of Insect collector

.....  
Entomologist

## Bioassay Test Record Sheet

Date:

Code the collector:

Code of team leader:

Name of VDC

Name of cluster/ Village:

Name of the insecticide used-

**Concentration of the insecticide per m<sup>2</sup>**

Test performed in – Lab/ field

Species of the sand fly exposed – *P. argentipes*/ *P. papatasi*

Temperature 24 hour:            Max:            / Min:            /

Exposure time:            minutes

**Batch Code:** --T

Hamlet / VDC (1,2,3,4) - arm-number of the test (T1,T2)

Household Code no.	Surface	Cone No.	Exposure period		24 hours		% Mortality rate	Species of Sand fly exposed	Remarks
			No. Hold	KD	Dead	Alive			
		1							
		2							
		3							
		4							
		5							

Percent control mortality

Percent test mortality

Percent corrected mortality

Signature

## **Participants of Kala Azar Technical Working Group & Consultative Meeting**

1. Dr. Guna Raj Lohani, Deputy Director General, DoHS
2. Dr. G.D. Thakur, Director, EDCD
3. Prof. Dr. Suman Rijal, BPKIHS
4. Dr. Yuv Raj Pokharel, Integrated Medical Officer, EDCD
5. Dr. Arjun Pant, Director, Sukraraj Tropical Infectious Disease Hospital
6. Dr. Ajay Kumar Thakur, Entomologist, TUTH
7. Dr. Rajendra Wagle, Maharajgunj Medical Campus, Institute of Medicine, Kathmandu
8. Dr. Megha Raj Banjara, Public Health and Infectious Disease Research Center
9. Dr. Bal Man Singh Karki, Academic Director, KIST Medical College
10. Dr. Manas Kumar Benerjee
11. Dr. Nihal Singh, MO-WHO-CDC
12. Dr. Keshav Kumar Yogi, NPO-NTD, WHO
13. Dr. Prakash Ghimire, NPO, WHO
14. Dr. Ravi Kafle, NPO, WHO
15. Prof. Dr Rupa Singh, BPKIHS
16. Prof. Dr Nisha K Bhatta, BPKIHS
17. Dr. Prahlad Karki, Head of Department Medicine, BPKIHS
18. Dr. Balaram Mishra, Janakpur Zonal Hospital
19. Dr. Shital Prasad Yadav, Koshi Zonal Hospital
20. Dr. S.N. Jha, Koshi Zonal Hospital
21. Dr. Pitambar Thakur, Mechi Zonal Hospital
22. Mr. Rakesh Thakur, DPHO Mahottari
23. Dr. Dawarika Prasad Sah, District Hospital Mahottari
24. Dr. Bishow Raj Khanal, Director, VBDRTC
25. Mr. Shishir Pant, Entomologist, VBDRTC, Hetauda
26. Mr. Chandreshwor Yadav, VCO, EDCD
27. Mr. Parshuram Shrestha, VCO, EDCD
28. Ms. Prava Sanjel, WHO
29. Mr. Sunil Aryal, WHO

### **Core Team**

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Dr Yuv Raj Pokhrel, Epidemiology and Disease Control Division

Dr Keshav Kumar Yogi, WHO Nepal