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# Vector-borne diseases and their relationship with the climate in the region of Huanuco, Peru

**Juan C. Huamani**
**National Service of Met. and Hydrology**
**SENAMHI – Huanuco**

**Adela Celis**
**Regional Direction of Health,**
**DIRESA – Huanuco**

# Outline

(1) Introduction

(2) Concepts

(3) General information

(4) Results

(5) Pending tasks

# Introduction

According to Ministry of Health of Peru, vector-borne diseases in the last decades is the main health problems affecting the poorest populations of less access and are ranked among the reemerging, affecting large proportions of the population, with great impact on public health national.

Malaria, Dengue, Bartonellosis, Leishmaniasis and Trypanosomiasis are the 05 health problems addressed from the NHS on the prevention and control of vector-borne diseases, whose increased transmission and increased risk factors, has become a priority its approach.

# Concepts

## EPIDEMIOLOGICAL CALENDAR

The calendar includes 52 epidemiological weeks that divide the 365 days a year. Its use during surveillance activities is important because the time variable standardization allows comparison of epidemiological events.

### Epidemiological week

Day period between Sunday and the following Saturday.

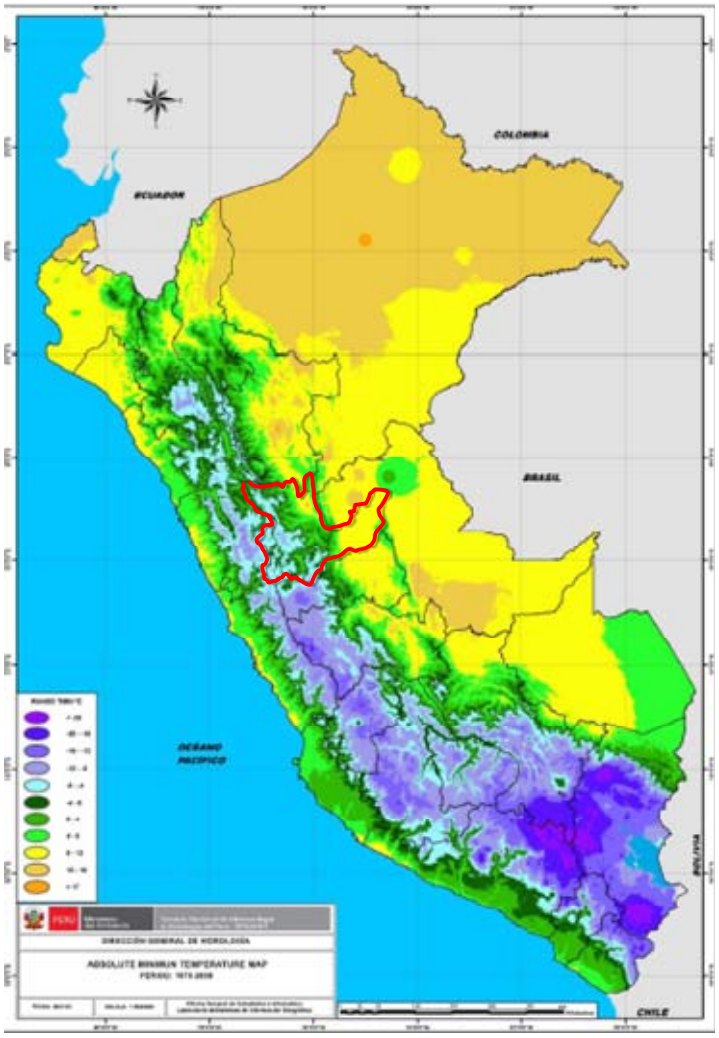
### Epidemiological period

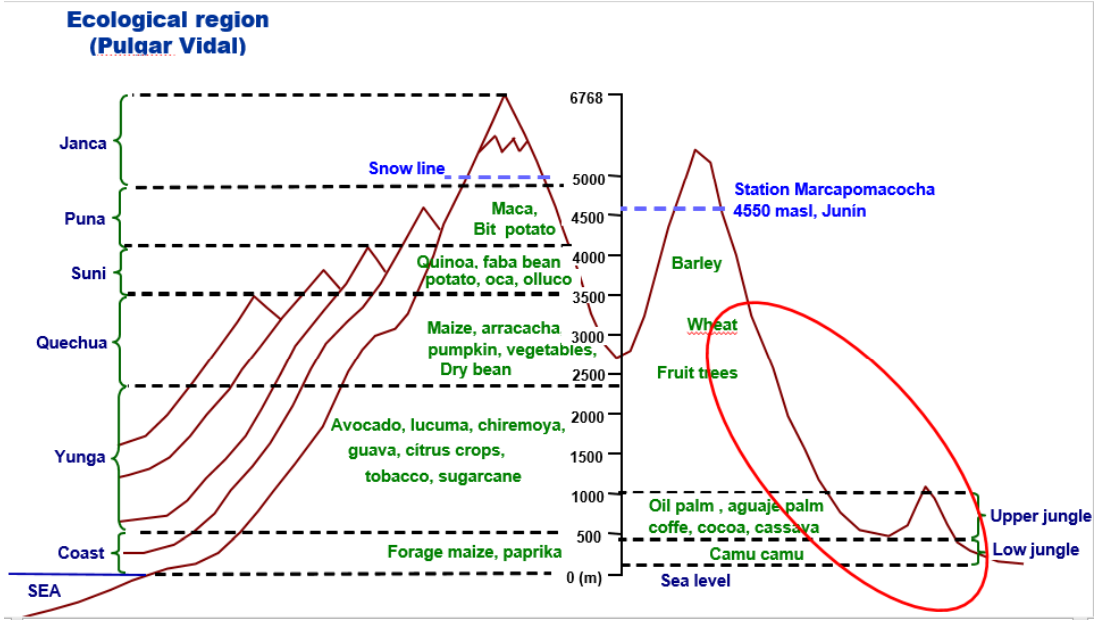
It is the set of time comprised four epidemiological weeks.

## VECTOR

A host that carries a pathogen without injury to itself and spreads the pathogen to susceptible organisms.

# Huanuco Region



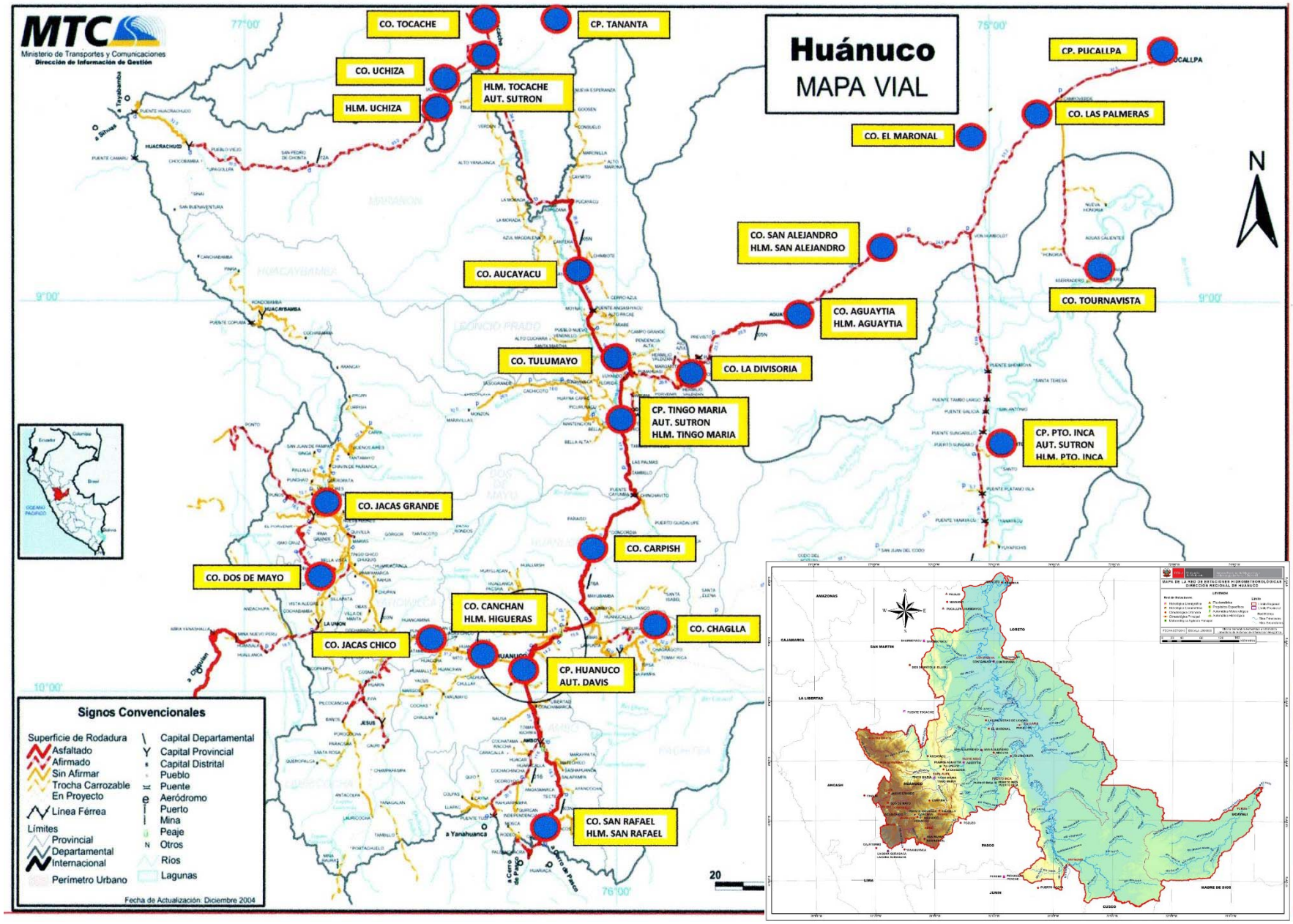




Huanuco region has a population of 847.714 inhabitants, 2.2% of the population are less than 1 year. The average population density is 22.4 inhab./Km2, with a variation in Puerto Inca 3 hab/Km2 to 66.3 inhab./Km2 in Huanuco district.

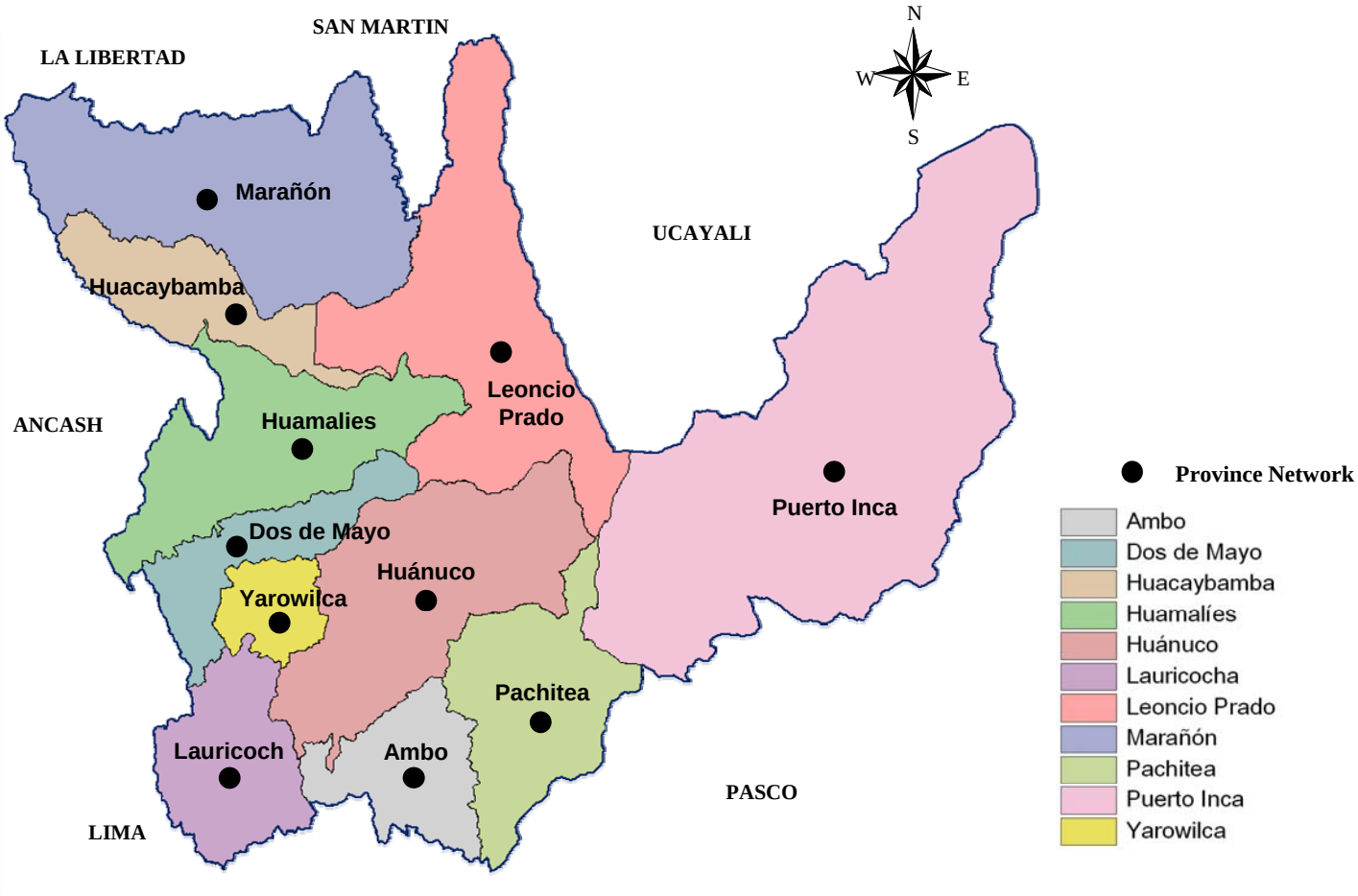
Altitude: Queropalca 3832 masl

Yuyapichis 250 msnm

# Hydrometeorological Network Stations
# Region of Huanuco

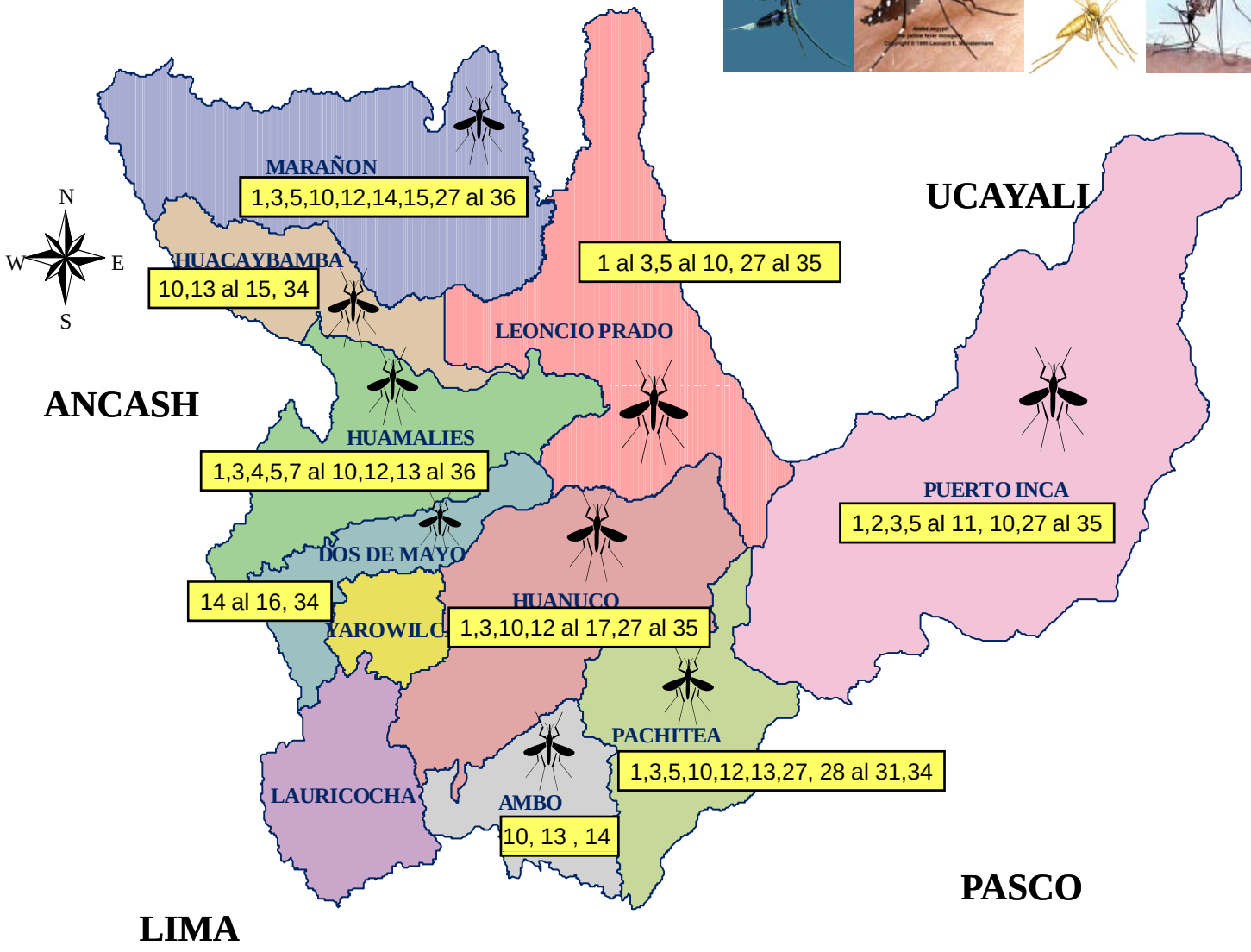


# Health Network of Huanuco Region
# R.E.R.746-2011-GRH/PR




Source: Dirección Ejecutiva de Epidemiologia.

# Geographic distribution of Vectors
# Huanuco Region - 2013



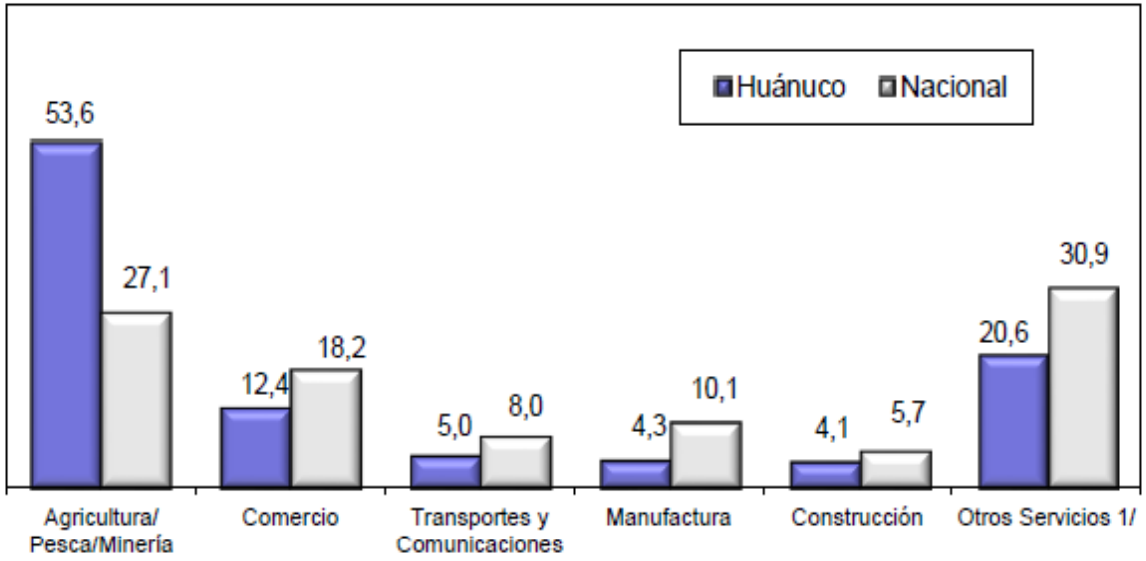

**LEGEND**

1. *Aedes aegypti*
2. *Ae. cuadrivittatus*
3. *Aedes spp.*
4. *An. benarrochi*
5. *An. Duhami*
6. *An. mattogrossensis*
7. *An. evansae*
8. *An. oswaldoi*
9. *An. rangeli*
10. *An. Pseudopunctipennis*
11. *An. mediopunctatus*
12. *Anopheles spp.*
13. *Lu. tejadai*
14. *Lu. verrucarum*
15. *Lu. fisheri*
16. *Lu. peruensis*
17. *Lu. serrana*
18. *Lu. odax*
19. *Lu. nevesi*
20. *Lu. sinuosa*
21. *Lu. sherlocki*
22. *Lu. monzonensis*
23. *Lu. gonzaloi*
24. *Lu. tuberculata*
25. *Lu. octavioi*
26. *Lu. sallesi*
27. *Lutzomyia spp.*
28. *Sabethes belisarioi*
29. *Haemagogus jantinomis*
30. *Culex coronator*
31. *Cu. corniger*
32. *Cu. Fatigans*
33. *Psorophora ferox*
34. *Psorophora spp.*
35. *Limatus spp.*
36. *Panstrongilus chinae*

Laboratorio de Entomología de la Red de Salud Leoncio Prado.

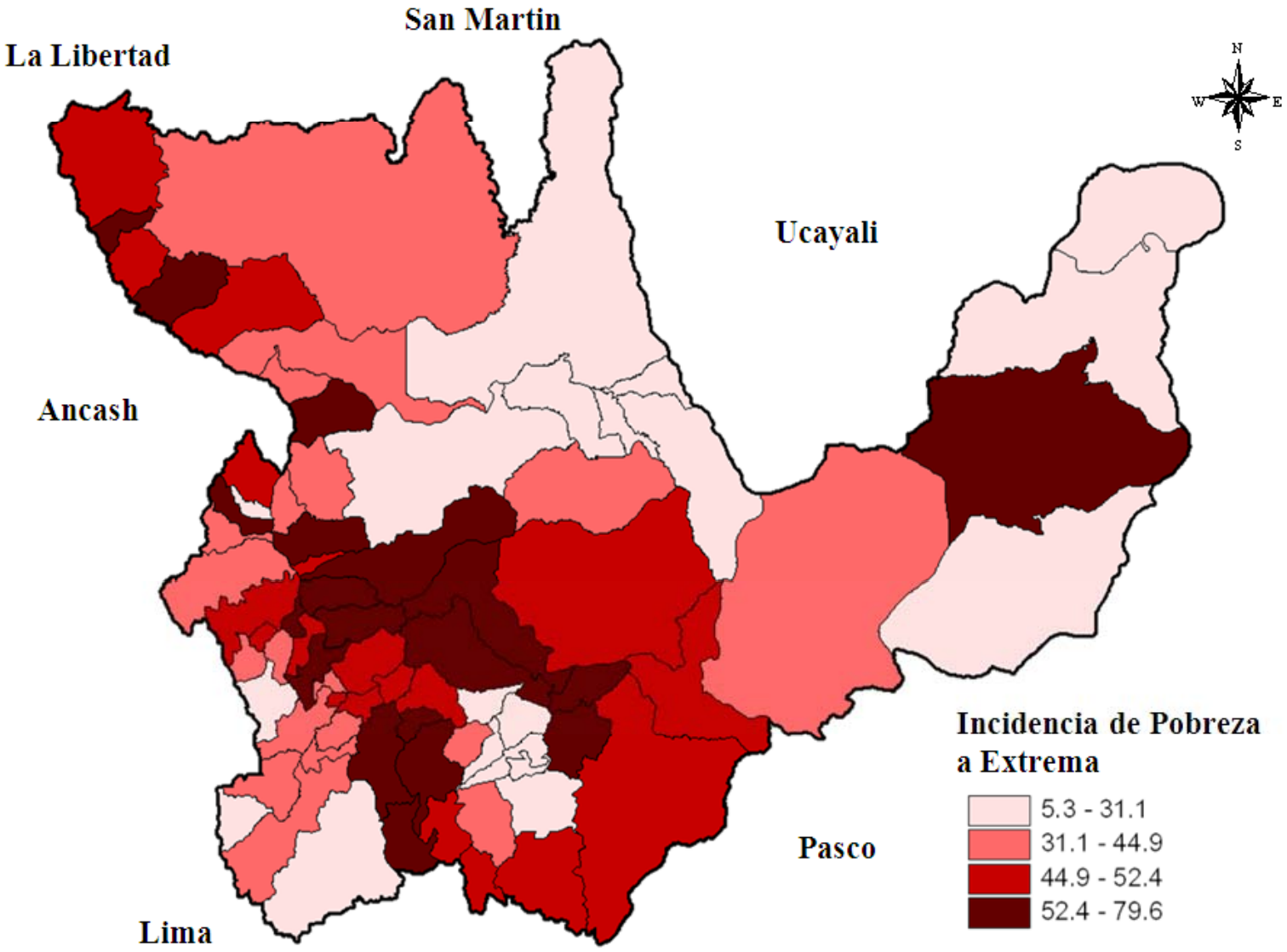
# Economical activities

**Población Económicamente Activa ocupada por rama de actividad, 2011**
(Porcentaje del total de la PEA ocupada)




1/ Comprende actividades como: Restaurantes y Hoteles, Sector Público, Salud, Educación, etc.
Fuente: INEI - Encuesta Nacional de Hogares (ENAHO), 2011.

# Incidencia de pobreza extrema Región Huánuco -2010



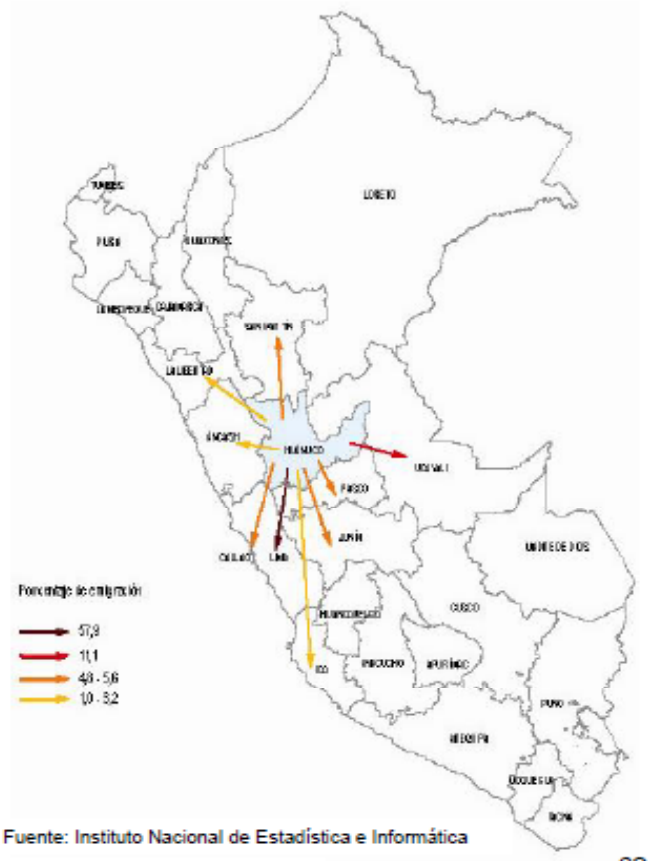

Fuente: INEI - 2011

# % De Población Emigrante a la Región Huánuco – 2002-2007

**EMIGRANTES, 2002-2007**
(Porcentaje de Emigrantes)

| Departamento | Emigrantes | (%) |
|---|---|---|
| Total | 66 202 | 100,0 |
| Lima | 38 341 | 57,9 |
| Ucayali | 7 367 | 11,1 |
| San Martín | 3 688 | 5,6 |
| Junín | 3 524 | 5,3 |
| Pasco | 3 455 | 5,2 |
| Prov. Const. del Callao | 3 175 | 4,8 |
| Ancash | 2 106 | 3,2 |
| Ica | 710 | 1,1 |
| La Libertad | 660 | 1,0 |
| Resto departamentos | 3 176 | 4,8 |

Fuente: INEI - Censos Nacionales 2007: XI de Población y VI de Vivienda.




Fuente: Instituto Nacional de Estadística e Informática

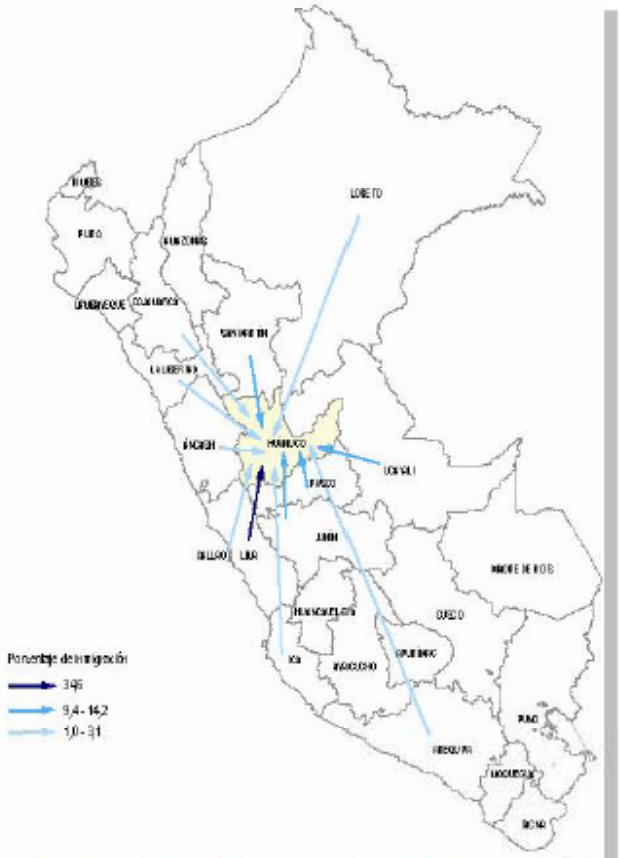

62

# % De Población Inmigrante a la Región Huánuco – 2002-2007

**INMIGRANTES**
**2002-2007**
**(Porcentaje de inmigrantes de 5 y más años)**

| Departamento | Inmigrantes | (%) |
|---|---|---|
| Total | 27 731 | 100,0 |
| Lima | 9 586 | 34,6 |
| Ucayali | 3 935 | 14,2 |
| Pasco | 3 792 | 13,7 |
| San Martín | 2 977 | 10,7 |
| Junín | 2 600 | 9,4 |
| Áncash | 848 | 3,1 |
| Loreto | 525 | 1,9 |
| Prov. Const. del Callao | 514 | 1,9 |
| Ica | 373 | 1,3 |
| La Libertad | 350 | 1,3 |
| Resto departamentos | 2 231 | 8,0 |

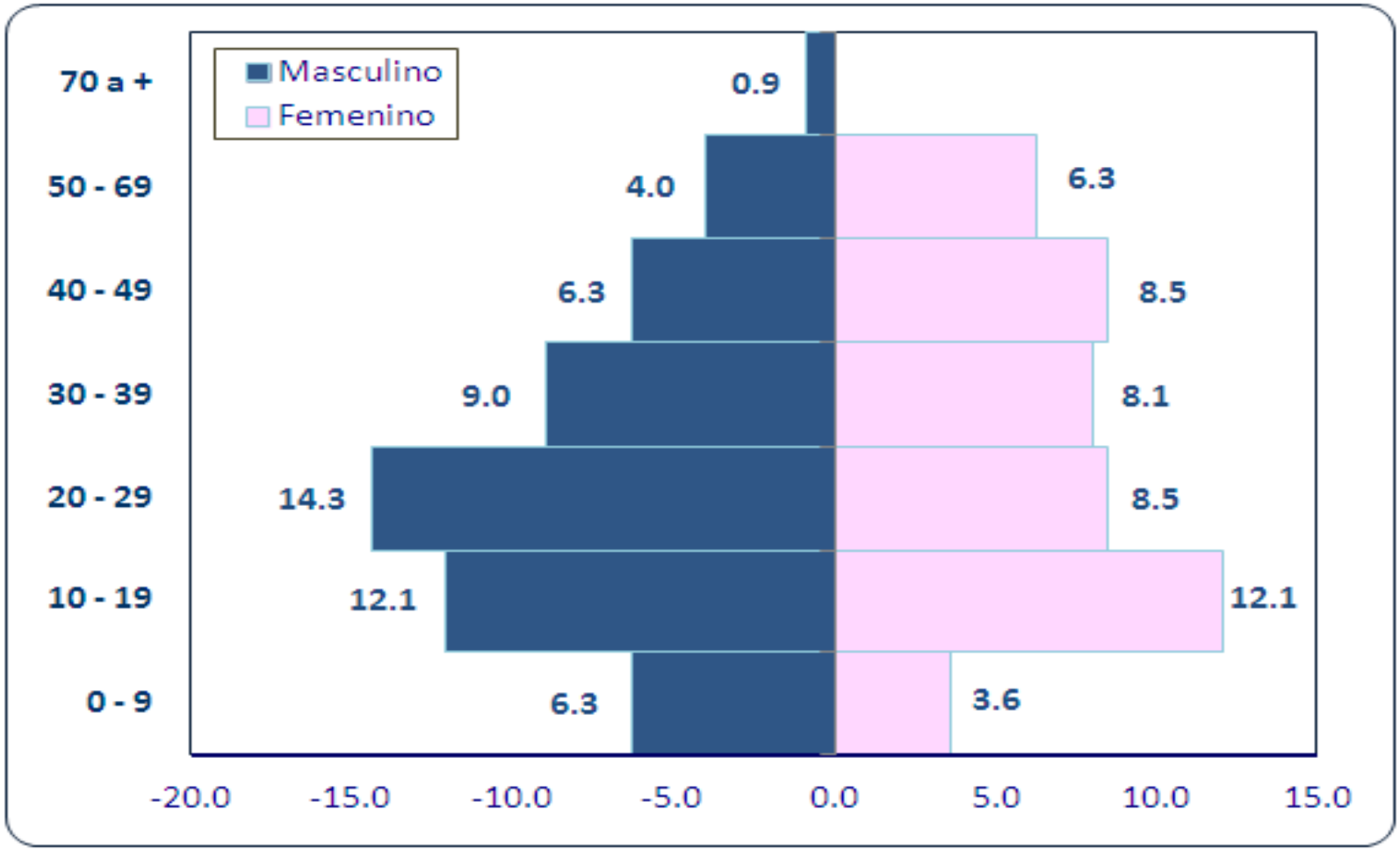
Fuente: INEI - Censos Nacionales 2007: XI de Población y VI de Vivienda.




Fuente: Instituto Nacional de Estadística e Informática


61

# Distribución de casos de dengue por (grupo de edad, sexo) DIRESA Huánuco 2013 (SE.01-30).

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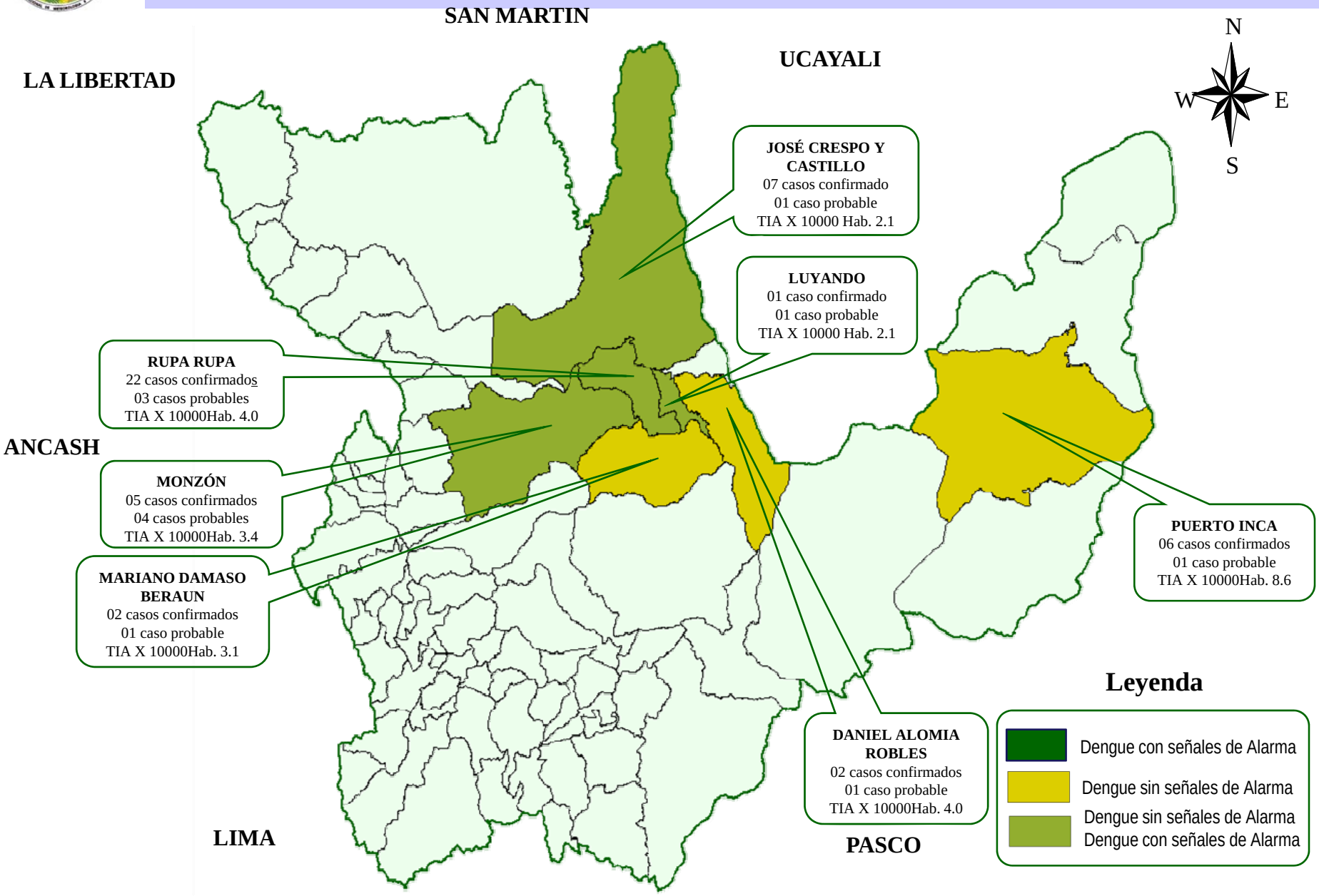
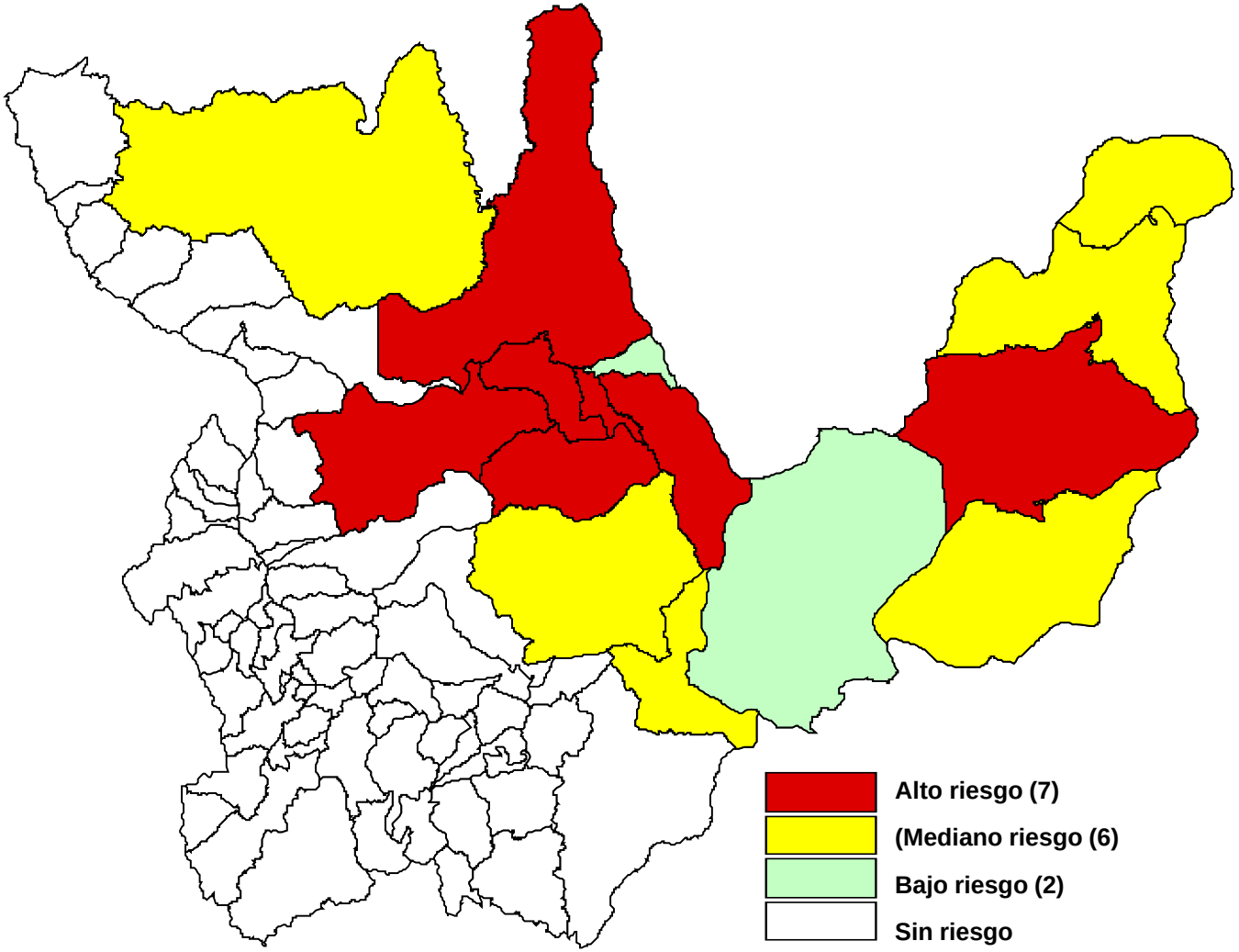
# Tasa de Incidencia de Dengue x 10,000 Hab, según Distritos .
# DIRESA Huánuco -2013 (SE 01 - 30)

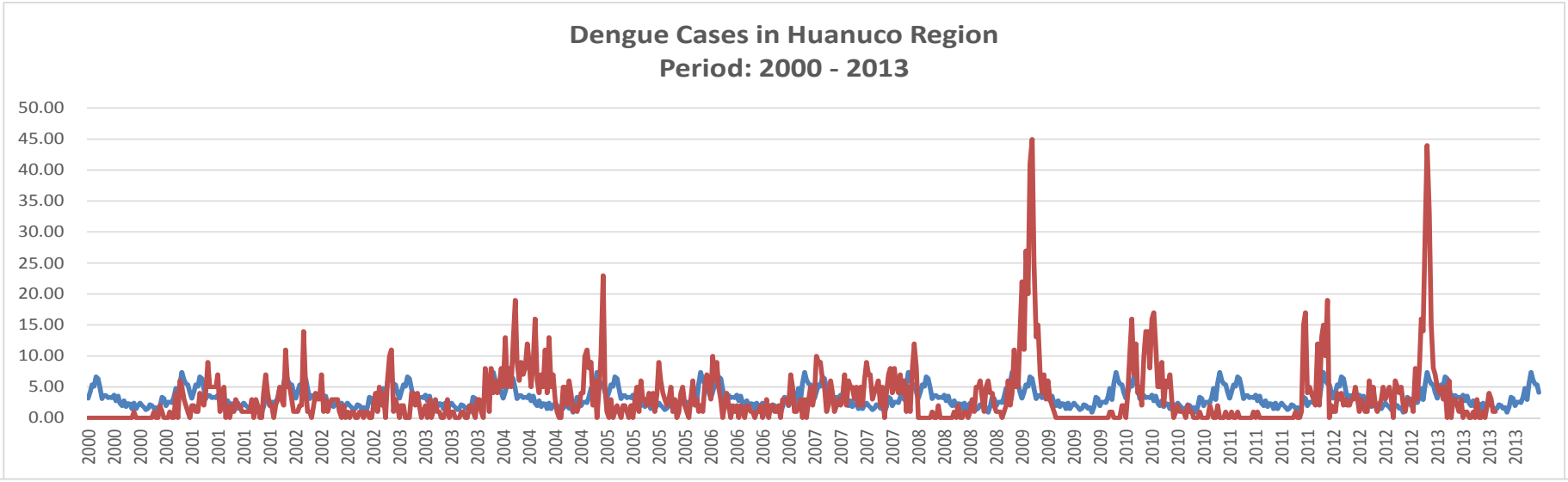


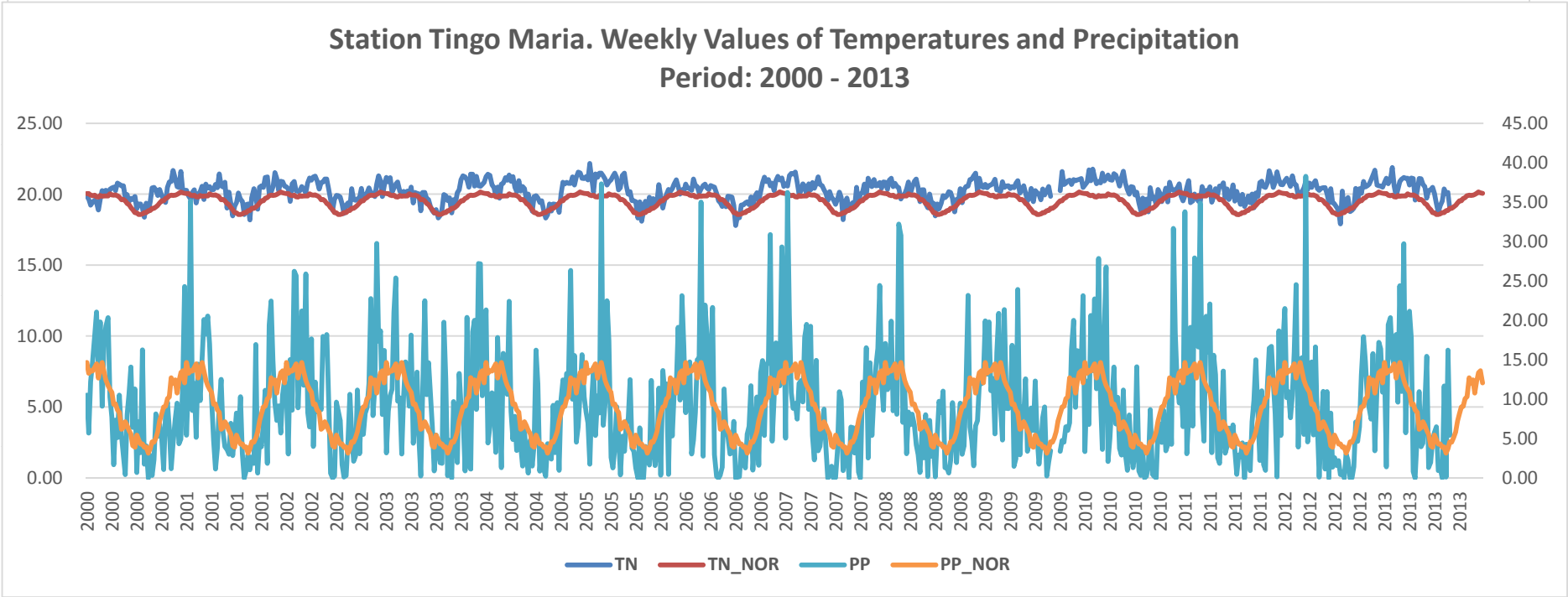
# Estratificación epidemiológica de Dengue- DIRESA Huánuco – 2013(SE.01-30)




Escenario I: Con riesgo de Introducción del vector ( Bajo riesgo)
Escenario II: Área con Aedes aegypti y sin casos de dengue ( Mediano Riesgo)
Escenario III- A-B: Área con Aedes aegypti y casos de dengue ( Alto riesgo )

# Comparison of Dengue cases with pp and Temp.



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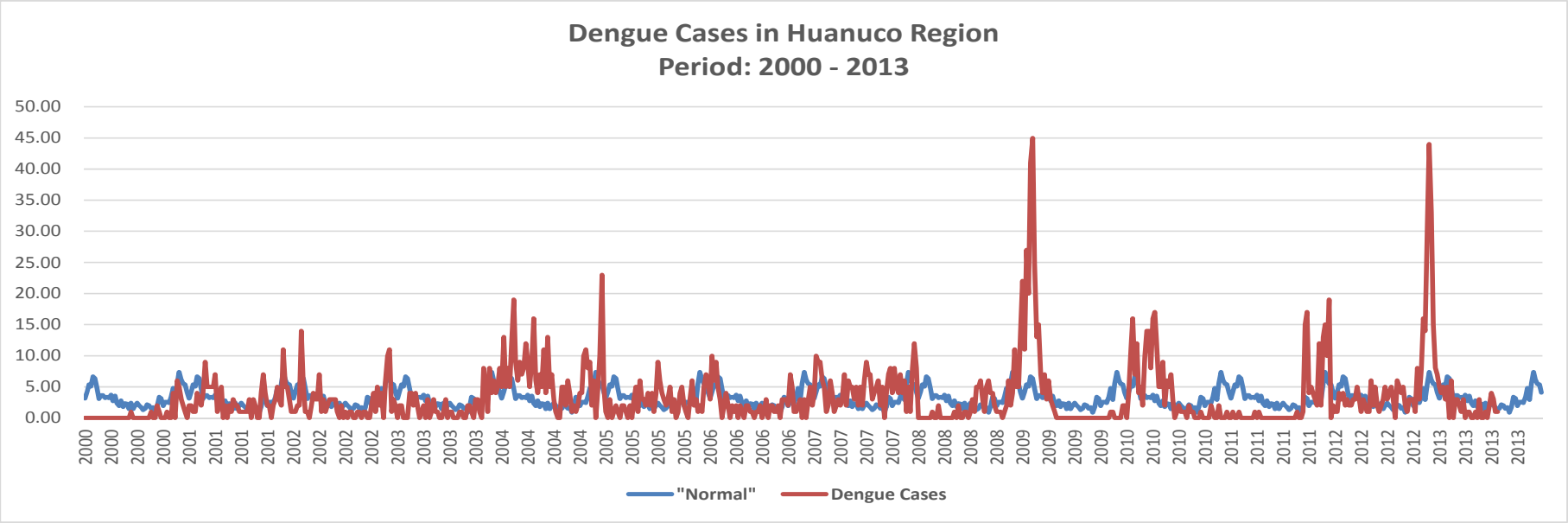
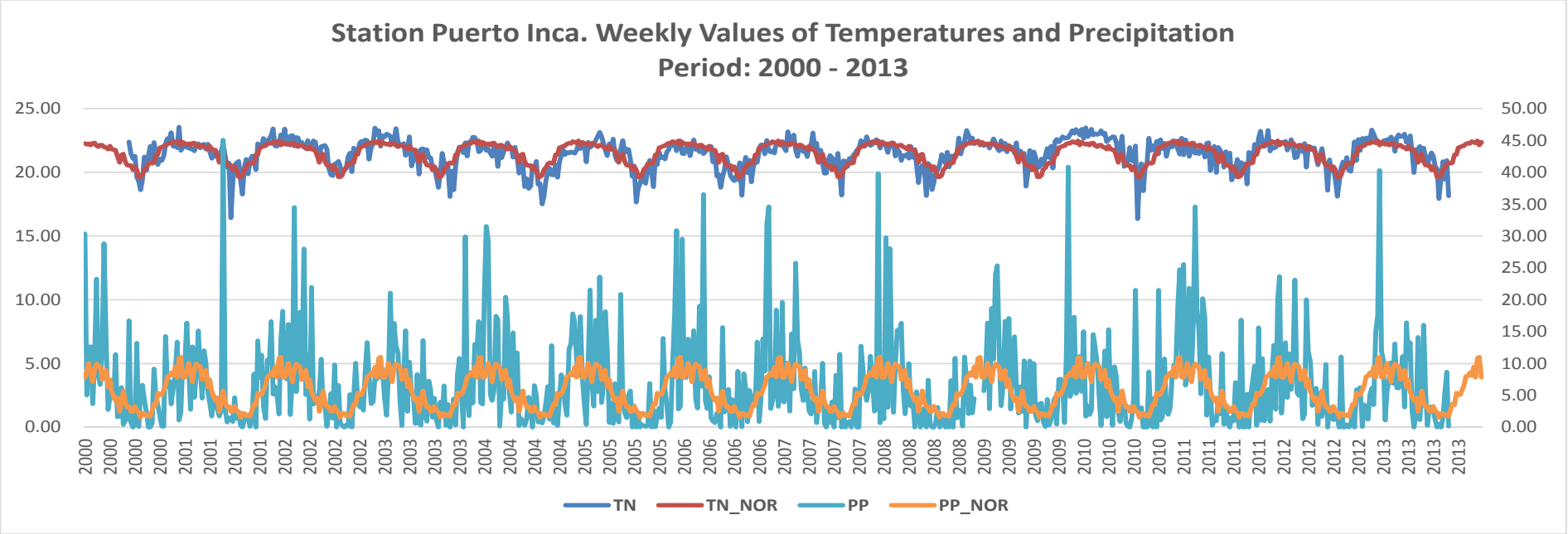
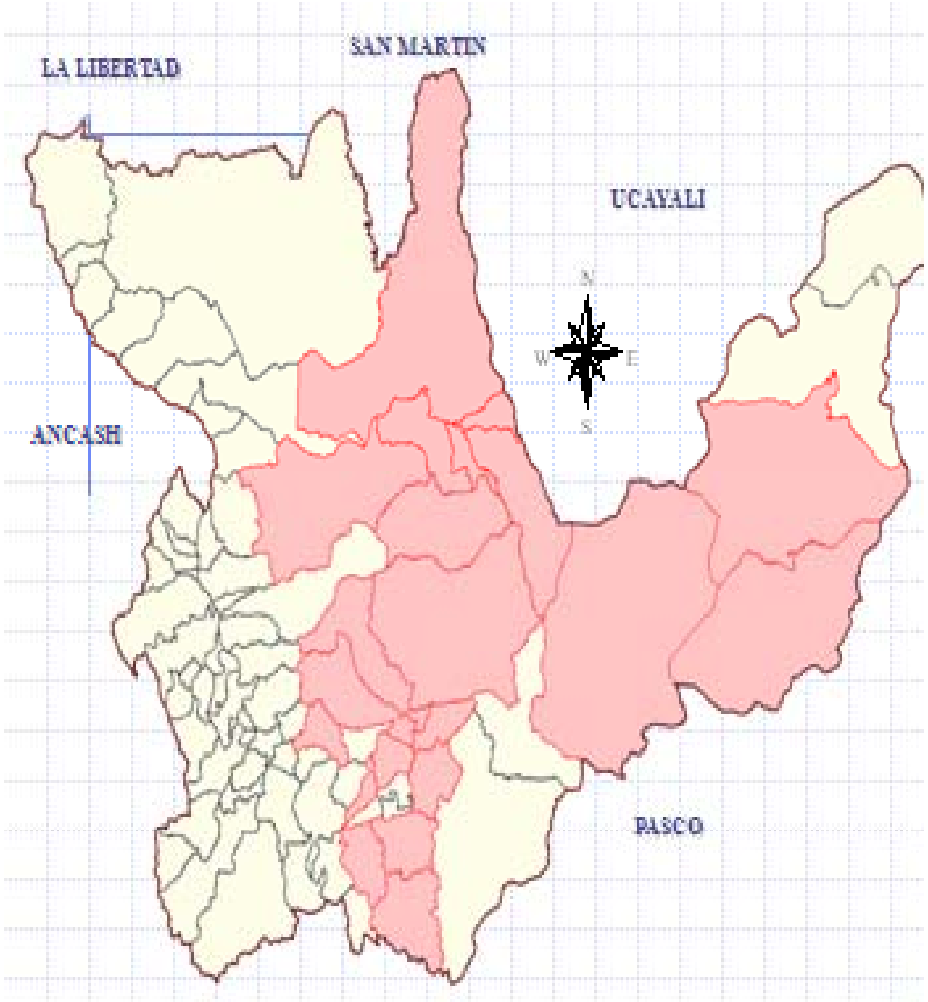


# Tasa de Incidencia de Leishmaniasis x 10,000 Hab, según Distritos . DIRESA Huánuco -2013 (SE 01 - 30)




| Distritos | Confirmados | TIA X 10000 |
|---|---|---|
| Daniel Alomia Robles | 9 | 11.9 |
| Hermilio Valdizán | 4 | 9.8 |
| Puerto Inca | 6 | 7.4 |
| Luyando | 4 | 4.1 |
| Mariano Damaso Beraun | 4 | 4.1 |
| Huacar | 3 | 3.8 |
| Yuyapichis | 2 | 3.3 |
| Codo del Pozuzo | 2 | 3.0 |
| José Crespo y Castillo | 10 | 2.7 |
| Quisqui | 2 | 2.5 |
| Chinchao | 5 | 2.0 |
| Monzón | 4 | 1.5 |
| Rupa Rupa | 8 | 1.3 |
| Ambo | 2 | 1.2 |
| Umari | 2 | 1.0 |
| Pillcomarca | 2 | 0.7 |
| Churubamba | 2 | 0.7 |
| Molino | 1 | 0.7 |
| Santa Maria del Valle | 1 | 0.5 |
| Amarilis | 3 | 0.4 |

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# Casos de Malaria P.vivax por Provincias y distritos Según años 1999-2013 ( SE.01-30

| DISTRITOS | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Huacaybamba | 8 | 0 | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cochabamba | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pinra | 10 | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Canchabamba | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Puerto Inca | 5 | 2 | 8 | 2 | 4 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Honoria | 0 | 0 | 3 | 0 | 2 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tournavista | 0 | 0 | 3 | 6 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Yuyapichis | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Codo Del Pozuzo | 2 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| Huacrachuco | 43 | 0 | 5 | 25 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cholon | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| San Buena Ventura | 13 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rupa Rupa | 0 | 0 | 4 | 5 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hermilio Valdizan | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Mariano Damaso Beraun | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jose Crespo Castillo | 0 | 0 | 1 | 1 | 2 | 35 | 9 | 1 | 0 | 9 | 0 | 1 | 0 | 0 | 0 |
| P.F.Luyando | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chinchao | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Amarilis | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Huanuco | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Monzon | 0 | 0 | 1 | 1 | 0 | 54 | 30 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chaglla | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **TOTAL** | **86** | **4** | **49** | **49** | **19** | **106** | **42** | **2** | **2** | **9** | **0** | **1** | **3** | **0** | **0** |

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# FINAL OBSERVATIONS

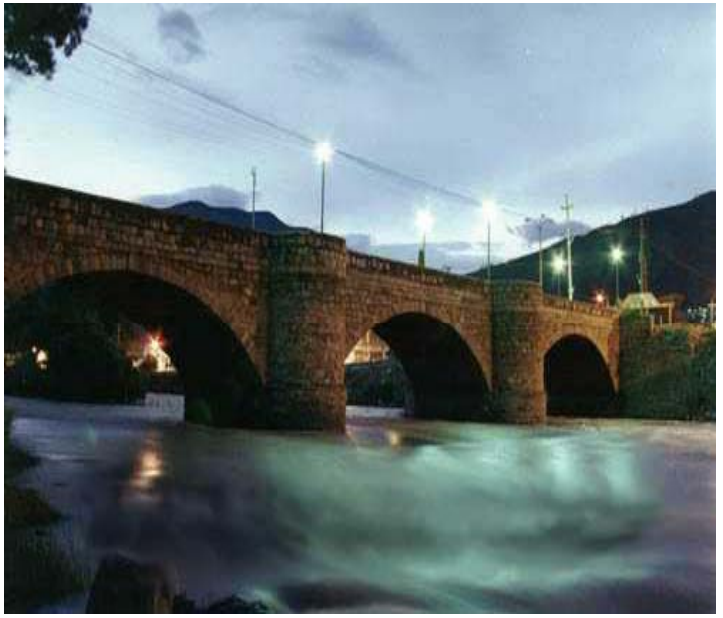
1) Multiple factors concur Dengue incidence and climatic variables are part of them.

2) It is importante the involvement ofentomologists concerning to reproduction and growth rate of the vectors.

**NEXT TASKS**

3) Generation of climate scenarios for a convenient scale (province, basin, influence area of the health center) for the Region of Huanuco.

4) Developing strategies in the health sector regarding to the occurrence of probable scenarios:
   - Incidence of heat/cold waves.
   - Incidence of vector-borne diseases.
   - Incidence of wáter-borne diseases.
   - Special treatment for endemic zones.



Thanks for your attention!