

# History and current situation of malaria in Sri Lanka



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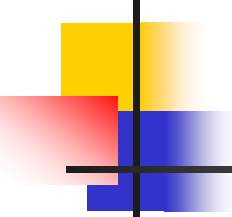
# Global epidemiology of malaria



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- At risk –
  - Approximately 40% of the global population
  - Occurs in over 101 countries
  - An estimated 1.5 – 2.7 million deaths per year

# Epidemiology of malaria in Sri Lanka

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- Tropical country- anybody is at risk
  - Risk higher in endemic areas of the dry & intermediate zones
  - Higher risk in some occupational groups – forces, chena cultivators, gem miners in the dry zone
  - Seasonality – dependent on the monsoons

# Epidemiology of malaria in Sri Lanka



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- Parasites

  - Plasmodium vivax* (75%, 2008 – 93%)

  - Plasmodium falciparum* (25%, 2008 – 7%)

- Vector mosquitoes

  - *Anopheles culicifacies*

  - *Anopheles subpictus*

  - *Anopheles annularis*




















# Reasons for intense transmission of malaria in Sri Lanka

- ❖ The physical environment in Sri Lanka (specially in the dry zone) is very conducive to malaria transmission
- ❖ From ancient times, the disease had been prevalent in the country
- ❖ Since the malaria vector mosquito in Sri Lanka breeds extensively in stagnant pools of clean, sunlit water, the river system in the country provides ideal breeding grounds during dry weather
- ❖ When development schemes (agricultural oriented) are established
- ❖ There are extensive and complex population movements within the country as a result of the change in socio-economic, which facilitates the spread of the disease.



# Great malaria epidemics in the past - some global examples



Country	Period	Magnitude
India	1908	100 Mil. patients 1 Mil. deaths
Soviet Union	1922 - 23	10 Mil. patients 60,000 deaths
Ceylon	1934 - 35	3 Mil patients 82,000 deaths
Ethiopia	1958	3 Mil. patients 150,000 deaths
Sri Lanka	1968-70	1.5 Mil. patients



# Epidemics of malaria in Sri Lanka

It is known that epidemics have occurred since 1877

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## Recorded epidemics after 1900

1906	1939 / 40
1911	1943
1914	1945 / 46
1919	1968 / 70
1923	1975
1928 / 29	1987
1934 / 35	1990 / 92



# Major determinants of malaria epidemics

- ▶ Temporary disturbances of a stable hypoendemic equilibrium
  - e.g.: abnormal meteorological conditions
- ▶ Major changes in the eco-epidemiological system ( shifting towards a new equilibrium of higher endemicity ).
  - e.g. introduction of irrigation in sparsely populated areas
- ▶ Interruptions of malaria control measures which have kept malaria under control.

# What caused malaria epidemics in Sri Lanka

- Most of the epidemics ( including the worst epidemic of 1934 / 35) occurred as a result of failure of one or both monsoons.
- Few epidemics (1968 - 70, 1975, 1987, 1991/92) were caused by operational failures including technical problems.



# Causation of the epidemic – 1934/35

## Genesis

Abnormally prolonged dry season ( in a relatively humid valley) leading to “pooling” of rivers in the “intermediate zone”.

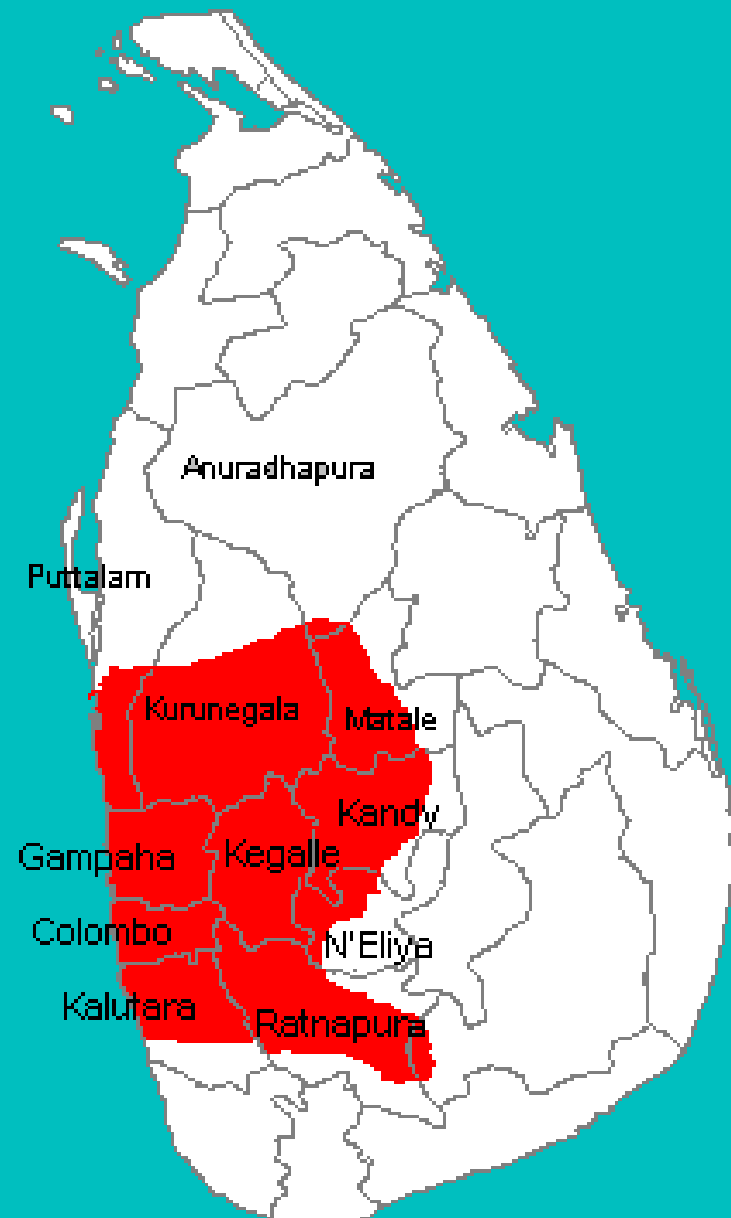
## Factors that favoured rapid spread

- ▶ Comparatively malaria-free few years preceding the epidemic led to loss of immunity in the population.
- ▶ Effective vector control measures were not available (esp. against adult vector)
- ▶ Adequate stocks of antimalarial drugs initially not available

# The great malaria epidemic of 1934 / 35 distribution



Patients - 1.5 Mil.  
Deaths - 82,000





# Parasite formula (1934 / 35)

## Country-wide \*

## Patients admitted to General Hospital, Colombo

*P.falciparum* - 38.5%

*P.falciparum* - 67.2%

*P.vivax* - 60.2%

*P.vivax* - 32.7%

*P.malaria* - 1.3%

*P.malaria* - nil

\* 10,215 blood smears taken during Nov.1934 - Feb. 1935



# **An Important observation made during the 1934 / 35 epidemic**

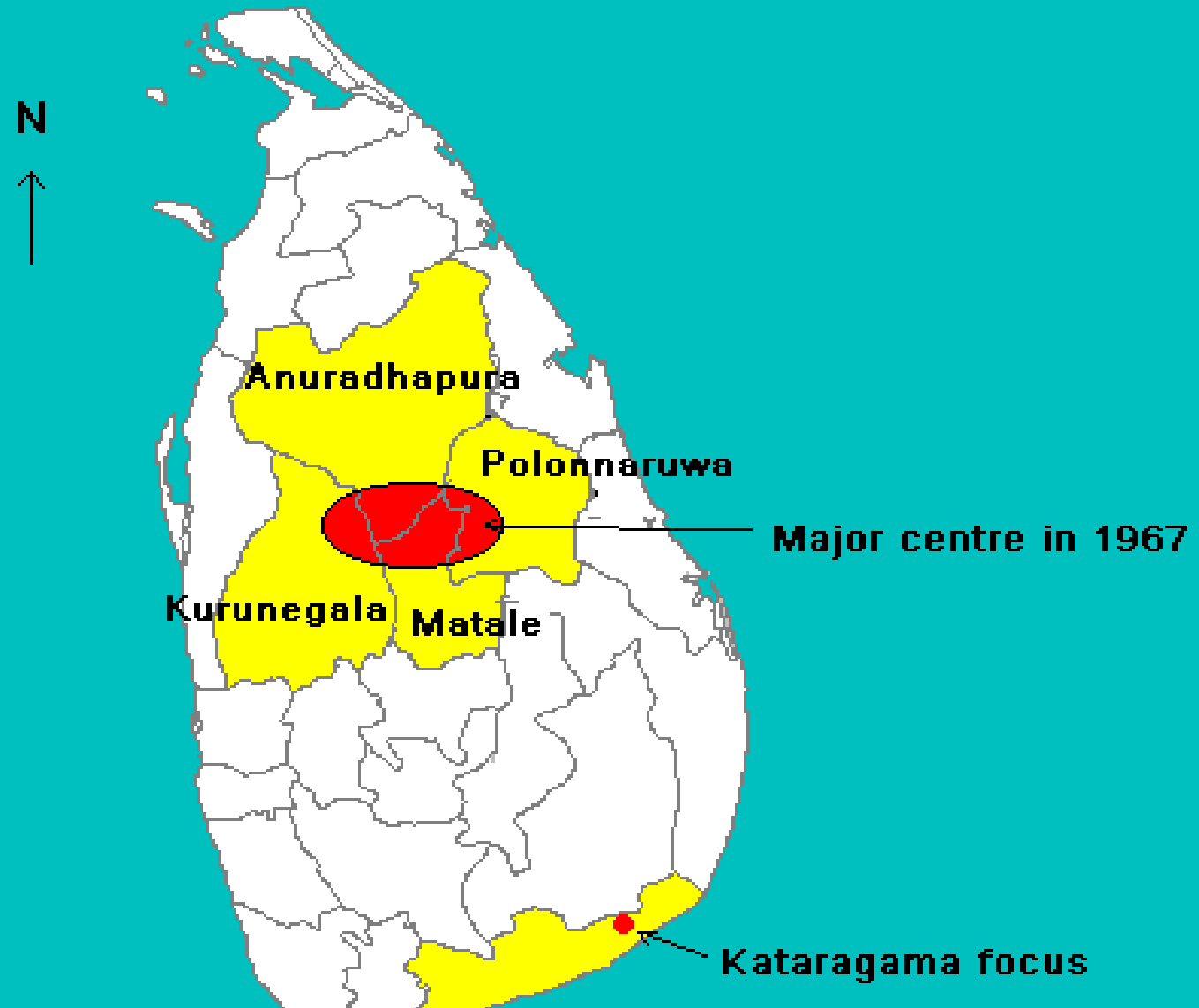
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Malaria parasite from the maternal circulation can cross the placental barrier and result in congenital malaria in the newborn.

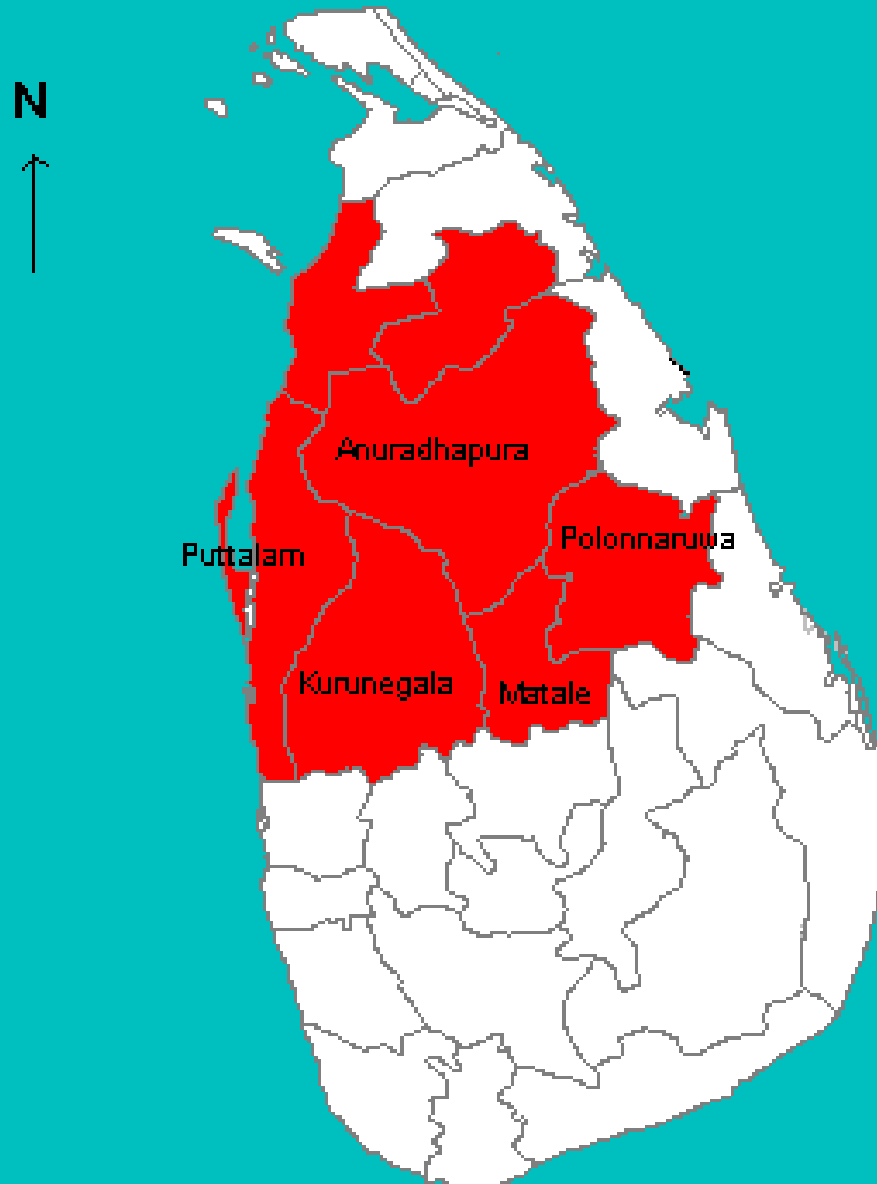


# The malaria epidemic 1967/68

## Spread



# Progress of spread - by early 1968





# Parasite formula 1967 / 1968



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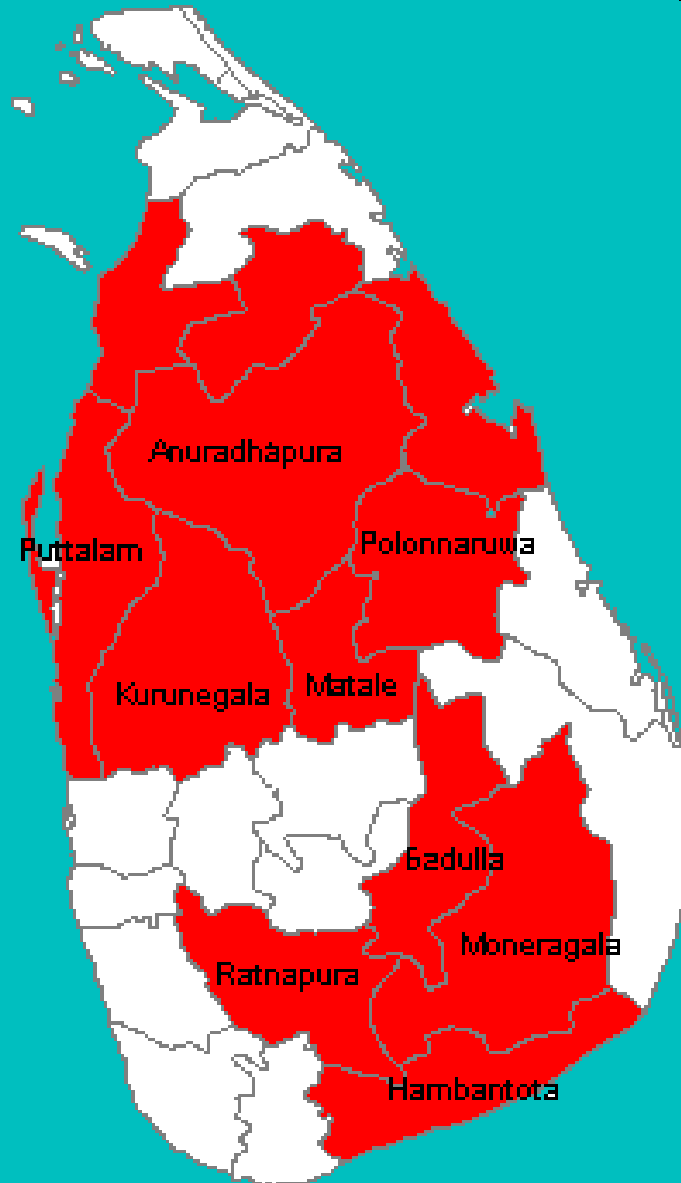
*P.v.* - 99.8%

*P.f.* - 0.15%

*P.m.* - 0.05%

# Progress of spread - by mid 1968

Total patients - 440644  
deaths - 64





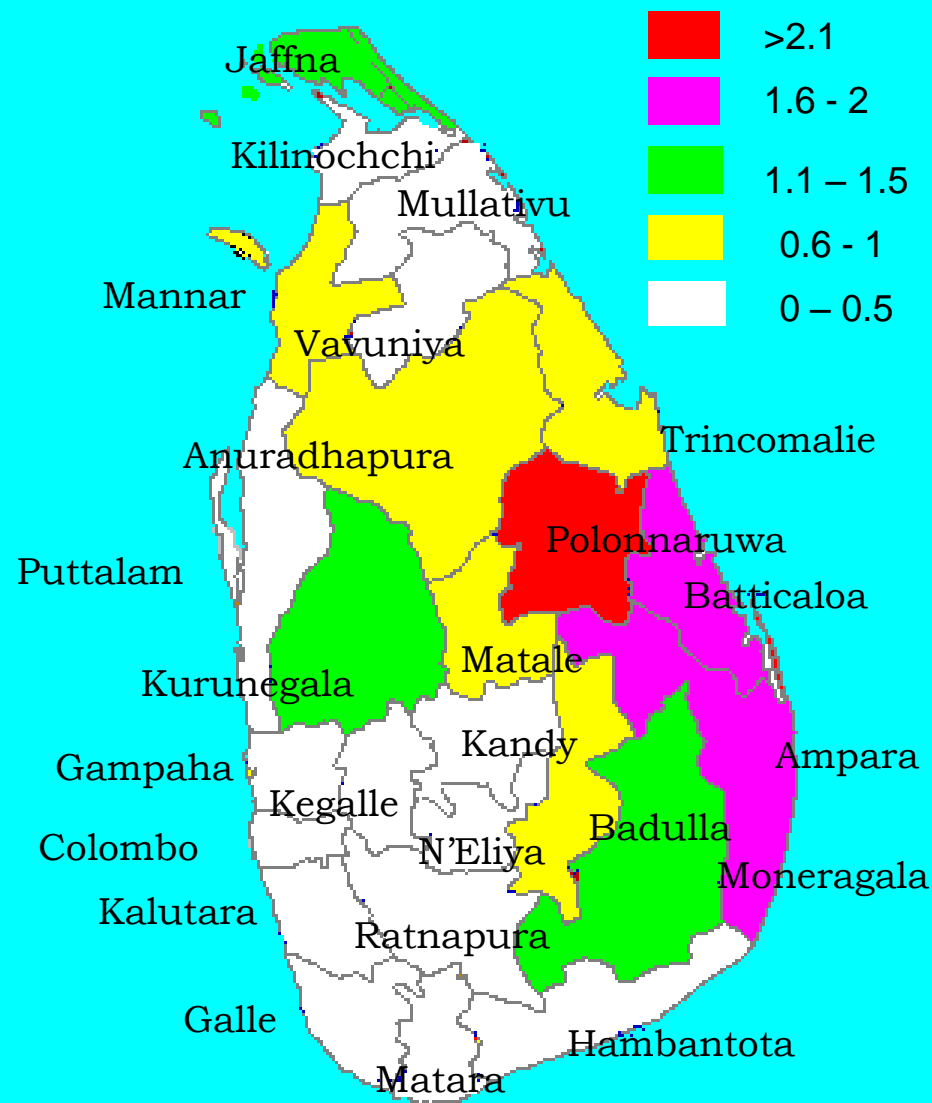
Year	No. of Blood films examined	No. of positive cases	<i>P.v.</i>	<i>P.f.</i>	<i>P.m.</i>	API
1995	1098105	142294	119056	23238		7.9
1996	1288990	184319	139362	44957		10.1
1997	1330659	218550	163856	54694		11.9
1998	1338146	211691	169295	42396		11.4
1999	1582111	264549	200671	63878		14.1
2000	1781372	210039	150389	59650		11.1
2001	1353386	66522	55922	10600		3.5
2002	1387953	41411	36535	4876		3.4
2003	1192259	10510	9237	1273		0.9
2004	1198181	3720	3171	549		0.8
2005	971121	1628	1494	134		0.4
2006	920655	553	529	24		0.09
2007	1044114	198	191	7		0.04
2008	1032270	670	623	46	1	0.15

# Intensity of Malaria Transmission in Sri Lanka ( Represented District-wise )

2004

API

N

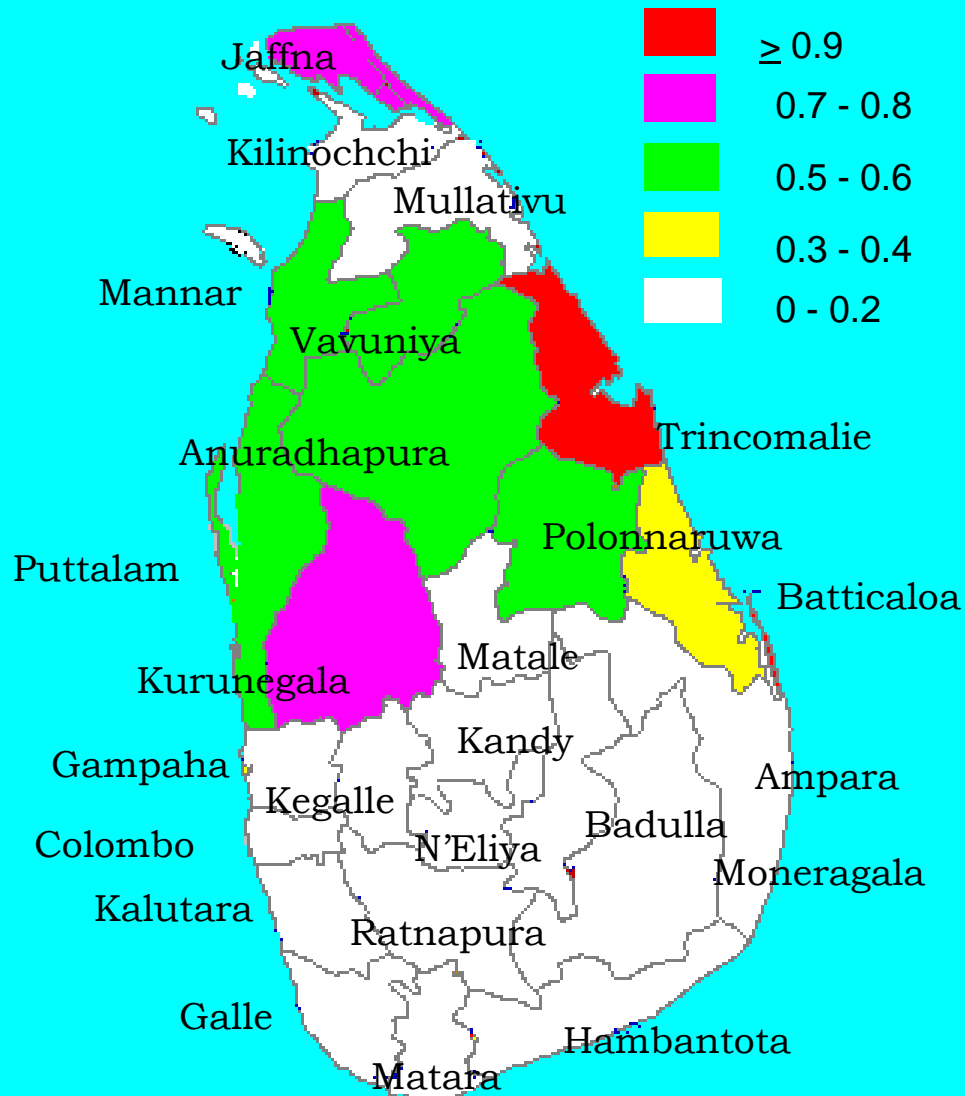




# Intensity of Malaria Transmission in Sri Lanka ( Represented District-wise )

2005

API



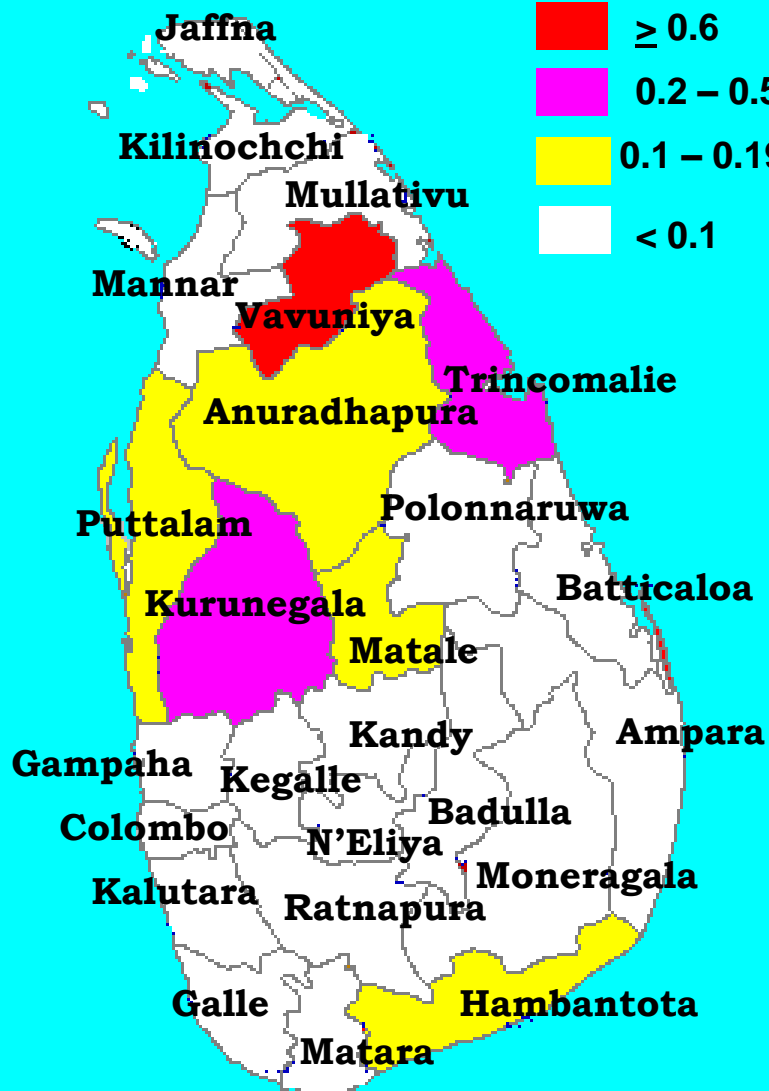
# Intensity of Malaria Transmission in Sri Lanka ( Represented District-wise )

2006

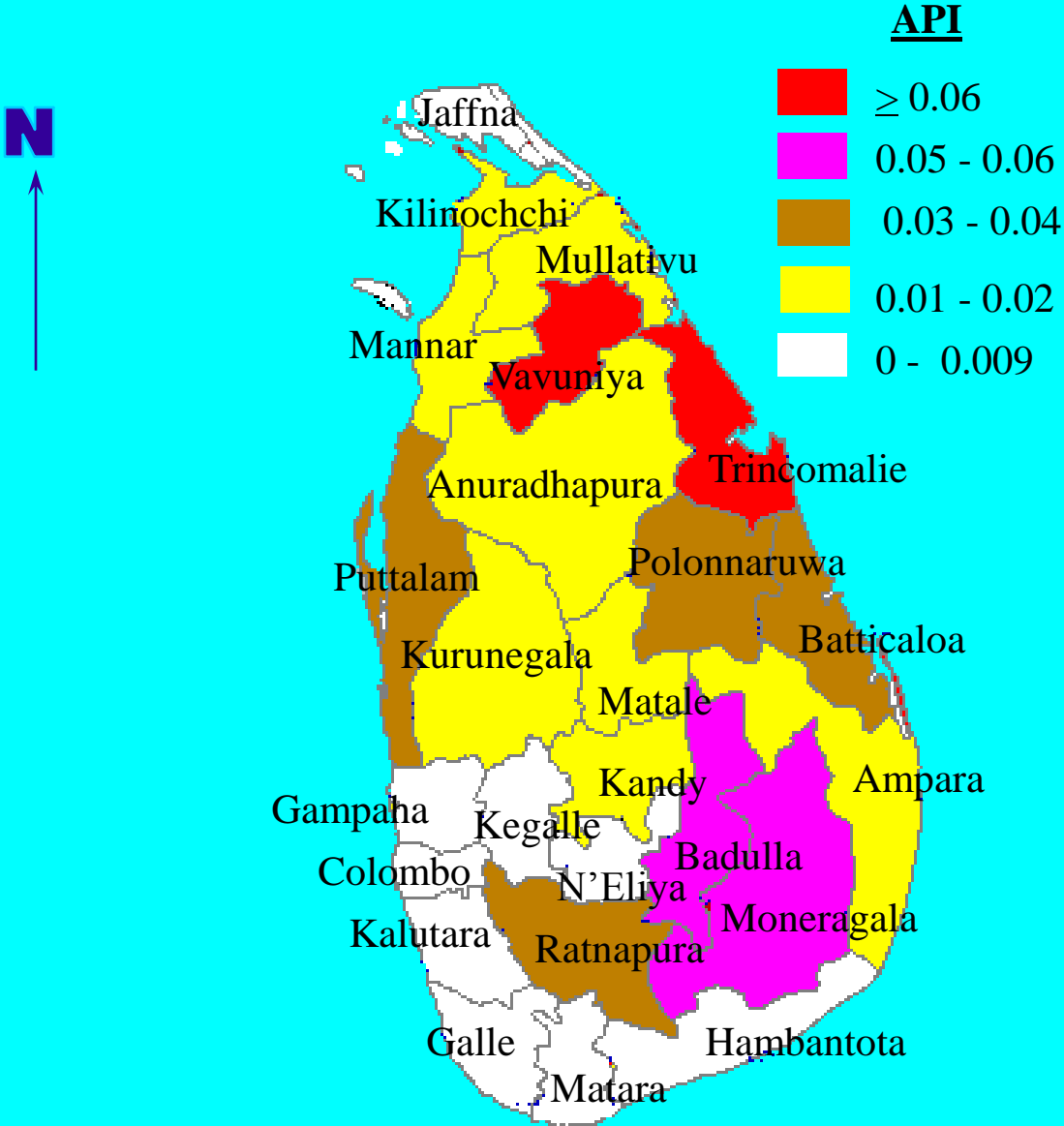
API



**N**



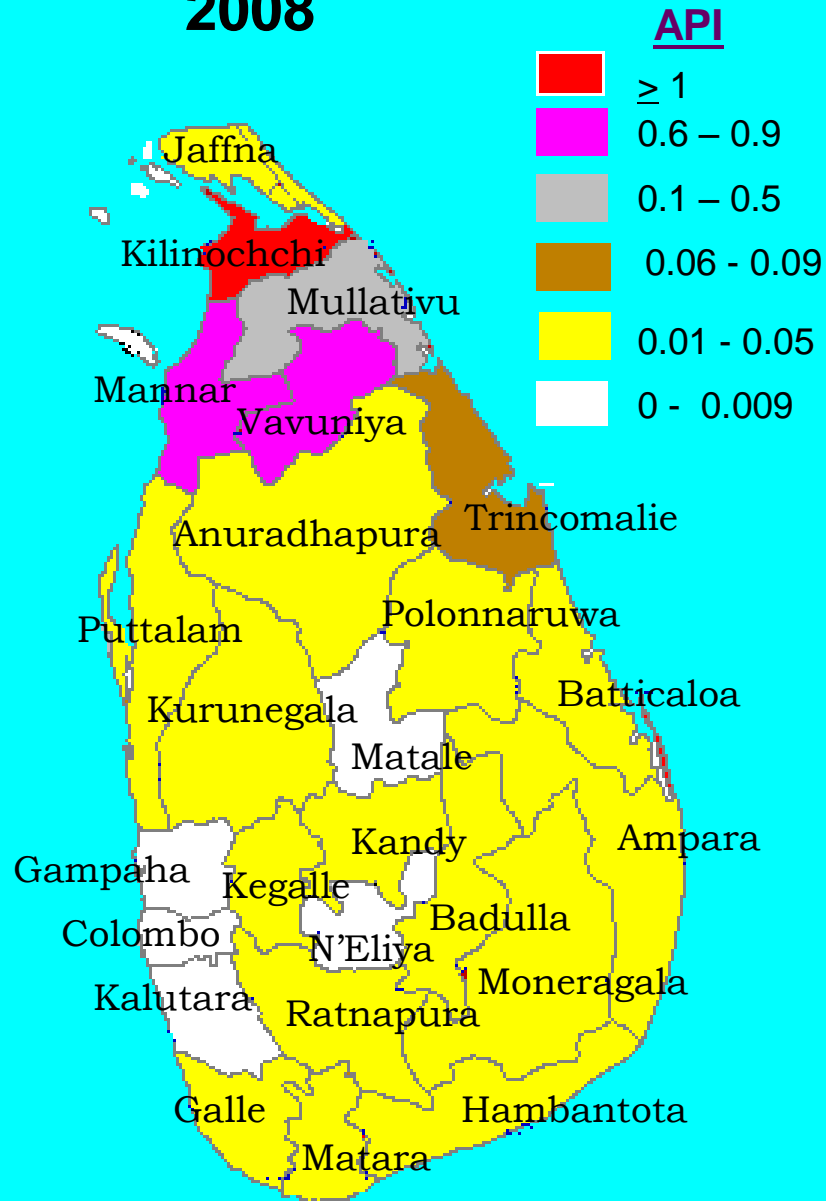
# Intensity of Malaria Transmission in Sri Lanka ( Represented District-wise ) 2007



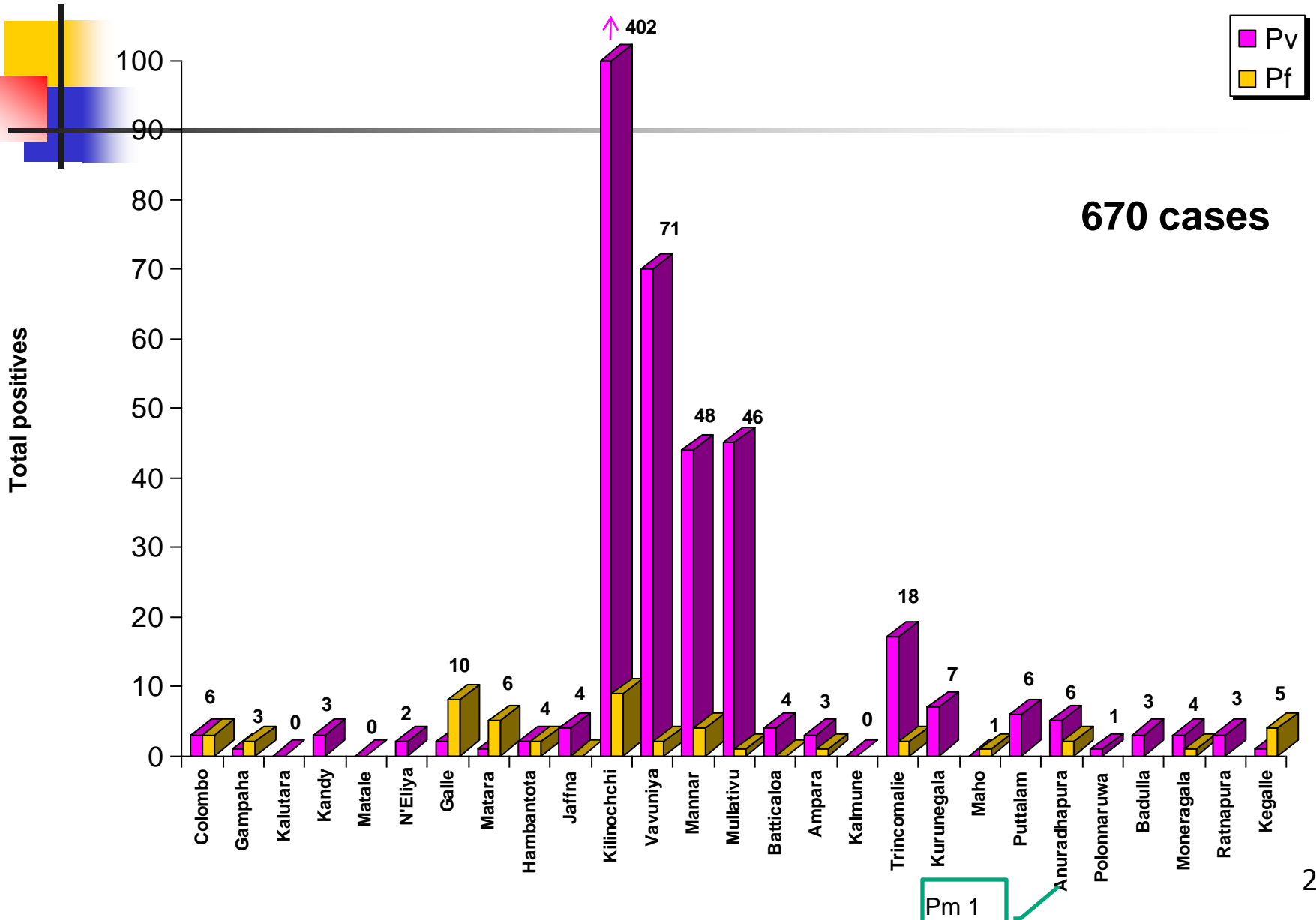


# Intensity of Malaria Transmission in Sri Lanka ( Represented District-wise )

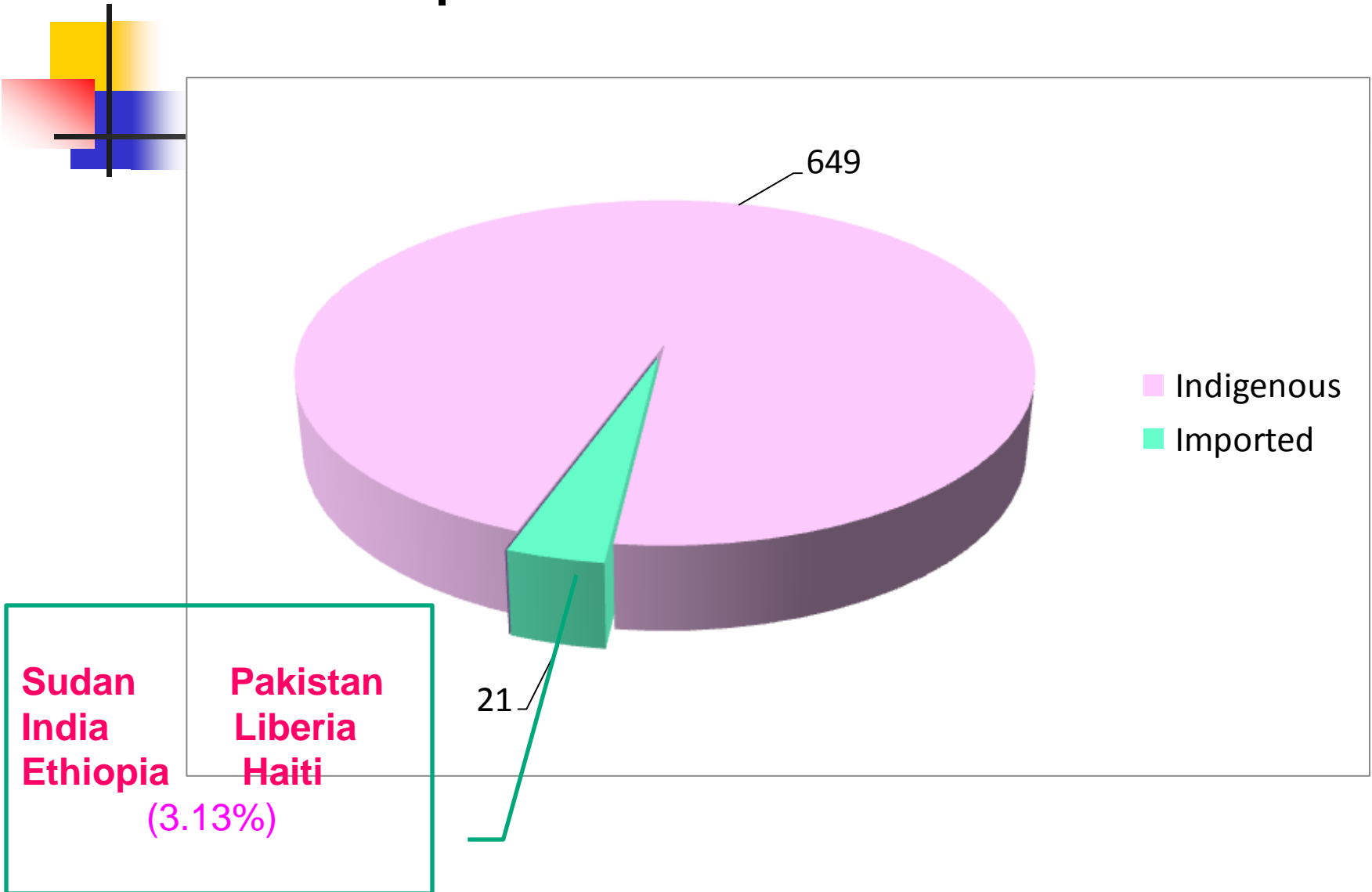
2008



# Microscopically confirmed total malaria patients in Sri Lanka - 2008 (district-wise)

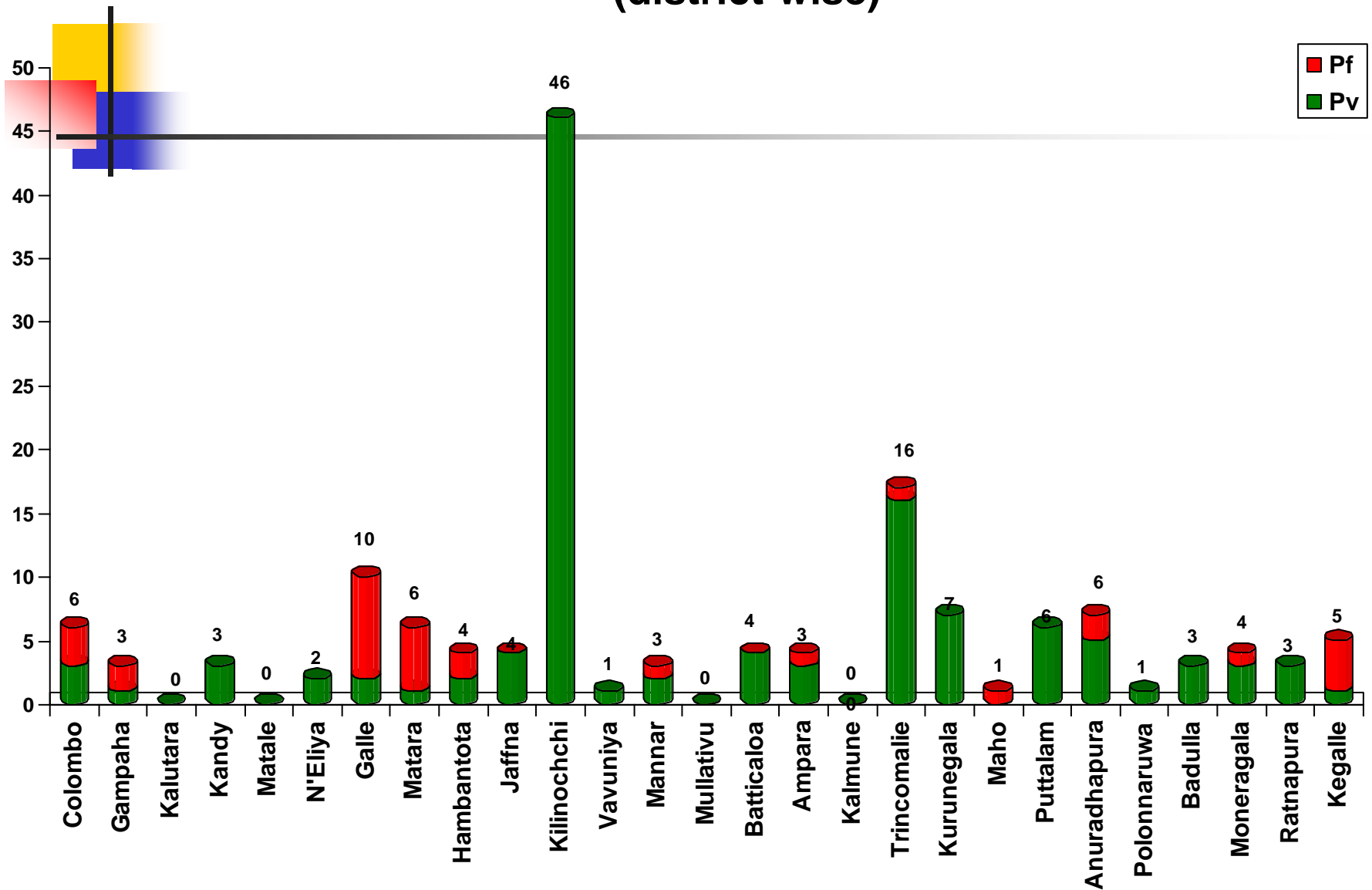


# Microscopically confirmed total malaria patients in Sri Lanka - 2008





# Microscopically confirmed malaria patients among civilians ( 150 ) in Sri Lanka - 2008 (district-wise)



## Malaria patients among forces

District	P.v.	P.f.
Kilinochchi	347	9
Vavuniya	69	2
Mannar	42	3
Mullativu	45	1
Trincomalie	1	1
<b>Total</b>	<b>500</b>	<b>17</b>



Year	No. of deaths
1998	115
1999	102
2000	76
2001	53
2002	30
2003	4
2004	1
2005	0
2006	0
2007	1
2008	1





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Thank you