Malaria parasite species

Confirmation of the diagnosis of malaria by microscopy gives an additional, critical advantage: identification of parasite species. Some rapid immuno-diagnostic(dipstick) methods will also achieve this. The importance of doing so is absolute, since severity of illness, mortality and correct drug therapy depend on parasite species recognition, whereas clinical diagnosis can only make a guess in deciding between malaria and other causes of fever, or in making appropriate therapeutic drug selection, without any comment on parasite species.

From the database leading to the presentation of confirmed case incidence in Figure 16 the information is available to also map relative parasite species distribution in 1998 (Figure 17a). Although the, data are presented by color density as % *Plasmodium falciparum* (blue dominance) they can also be interpreted inversely as % *P. vivax* (green dominance).

On this basis, in Myanmar, Lao PDR, Cambodia and Viet Nam *P. falciparum* appears to be dominant, Thailand shows a mixed pattern, in Yunnan *P. vivax* is dominant with small areas of *P. falciparum*, Hainan is. mixed, Guangxi has predominantly *P. vivax*. In other words, areas identified as having high overall malaria case incidence tend to be predominantly areas of P. falciparum infection. However, the limitation to this presentation is the lack of quantitative correlation of each species in any particular administrative area: color intensity is party misleading, since it relates to relative species prevalence and gives no indication of parasite incidence.

To provide a more quantitative perspective, the incidence profiles of *P. falciparum* and *P. vivax* have been mapped separately in Figure 17b and Figure 17c, respectively. Cross reference to these two maps expands the interpretation of Figure 17a.

From this consortium of maps it becomes clearer that, although there are large areas where one or other parasite species tends to dominate, both species have wide distribution. Both parasite species may have high incidence in the same area (e.g. on the Thai side of he Thai-Myanmar border: Figures 17b and 17c). However, an interesting feature is the relative species demarcation that appears to occur along or near to some international borders in Figure 17a, e.g. Myanmar/Yunnan, Lao PDR/ Yunnan. From Figures 17b and 17c it is evident that this apparent demarcation also reflects differences in parasite incidence on each side of the respective borders.

Micro-mapping is required for further analysis in the border areas and within each administrative area: to ascertain whether local conditions favor transmission of either species and whether parasite spread due to population mobilty across international borders or internal boundaries are important factors in the overall patterns.

In addition it is pertinent to ask whether there are possibly any technical factors that might contribute bias to this species pattern. Certainly when mixed infections occur in individuals, *P. vivax* may often be masked and missed by microscopy. *P. vivax* frequently has lower parasitemia than *P. falciparum* and so may be more often ignored when time per slide examination is short as will frequently occur when there is a high throughput of patients in a clinic. It is also conceivable that because of its frequent severity a patient with *P. falciparum* infection may be more likely to present to the clinic, leading to reporting bias, but comparison among the six country profiles suggest this may not be a major factor. However, in mixed infections when *P. falciparum* masks the concurrent *P. vivax*, the mixed nature of the infection becomes apparent only late in the therapeutic time course.

On the evidence presented here it is not feasible to give definitive explanations of the differential parasite species distribution but it is apparent that the intriguing patterns should stimulate research questions pertinent to control program management, especially to drug policy planning. The latter process ideally requires continuing detailed parasite species distribution data with frequent reporting: the combination of rapid on-site (dipstick) diagnosis with micro mapping of parasite species has a lot to offer in the formulation and implementation of more effective regional approach to appropriate drug therapy.

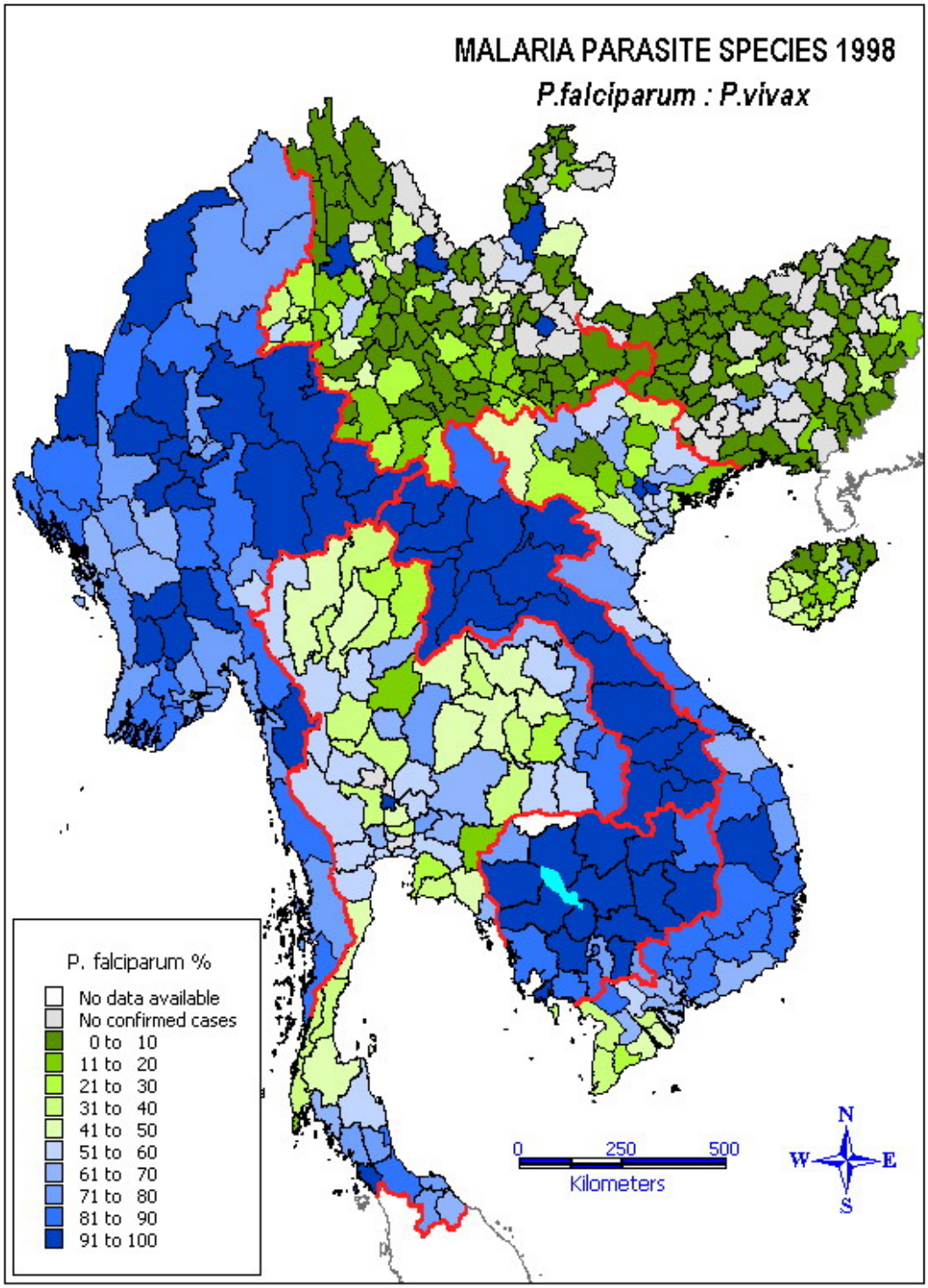
MALARIA PARASITE SPECIES 1998
P.falciparum : P.vivax
P. falciparum %
No data available
No confirmed cases
0 to 10
11 to 20
21 to 30
31 to 40
41 to 50
51 to 60
61 to 70
71 to 80
81 to 90
91 to 100
0
250
500
Kilometers
N
W
E
S

Figure 17a.

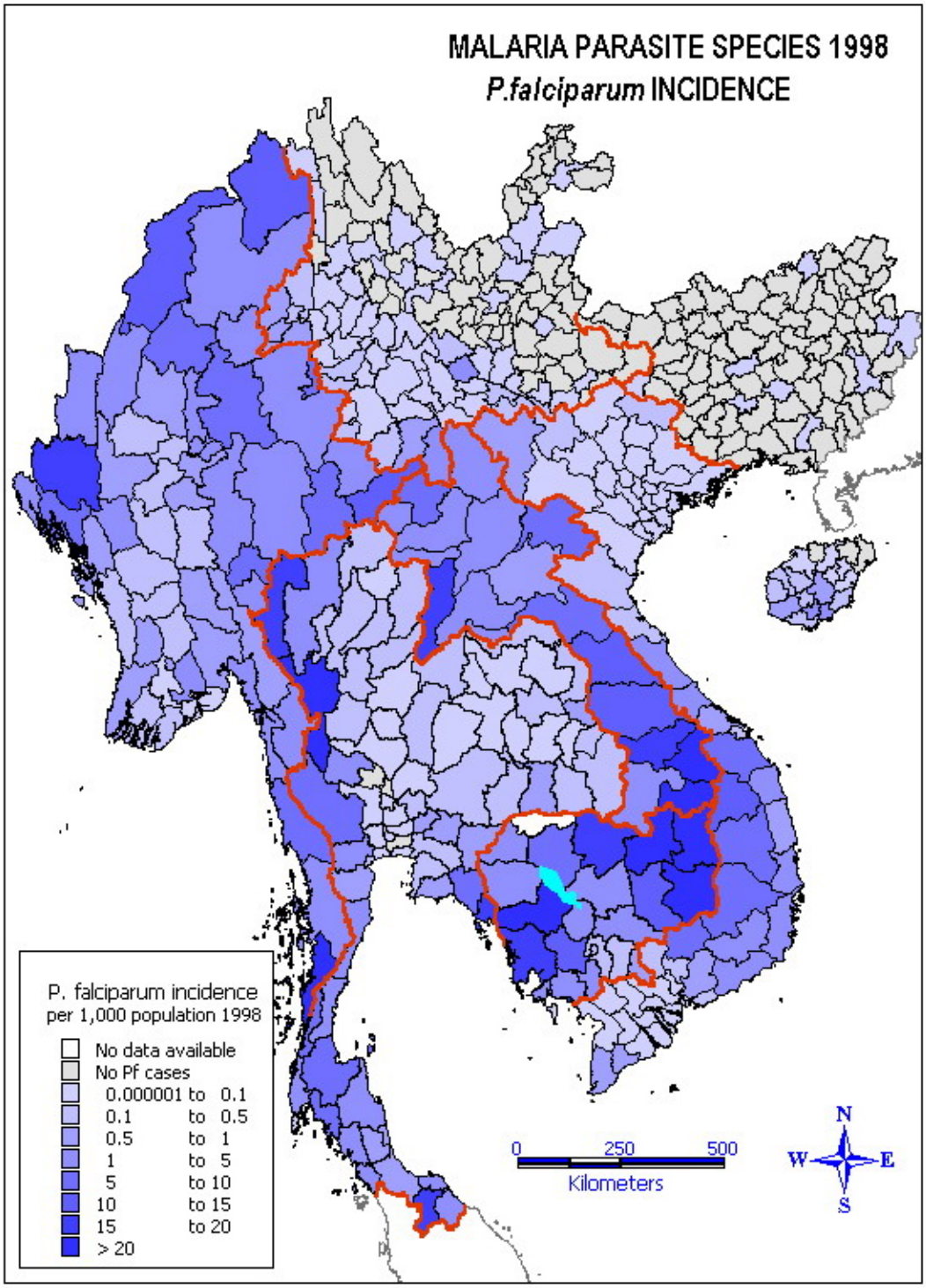
MALARIA PARASITE SPECIES 1998
P.falciparum INCIDENCE
P. falciparum incidence
per 1,000 population 1998
No data available
No Pf cases
0.000001 to 0.1
0.1 to 0.5
0.5 to 1
1 to 5
5 to 10
10 to 15
15 to 20
> 20
0
250
500
Kilometers
N
W
E
S

Figure 17b.

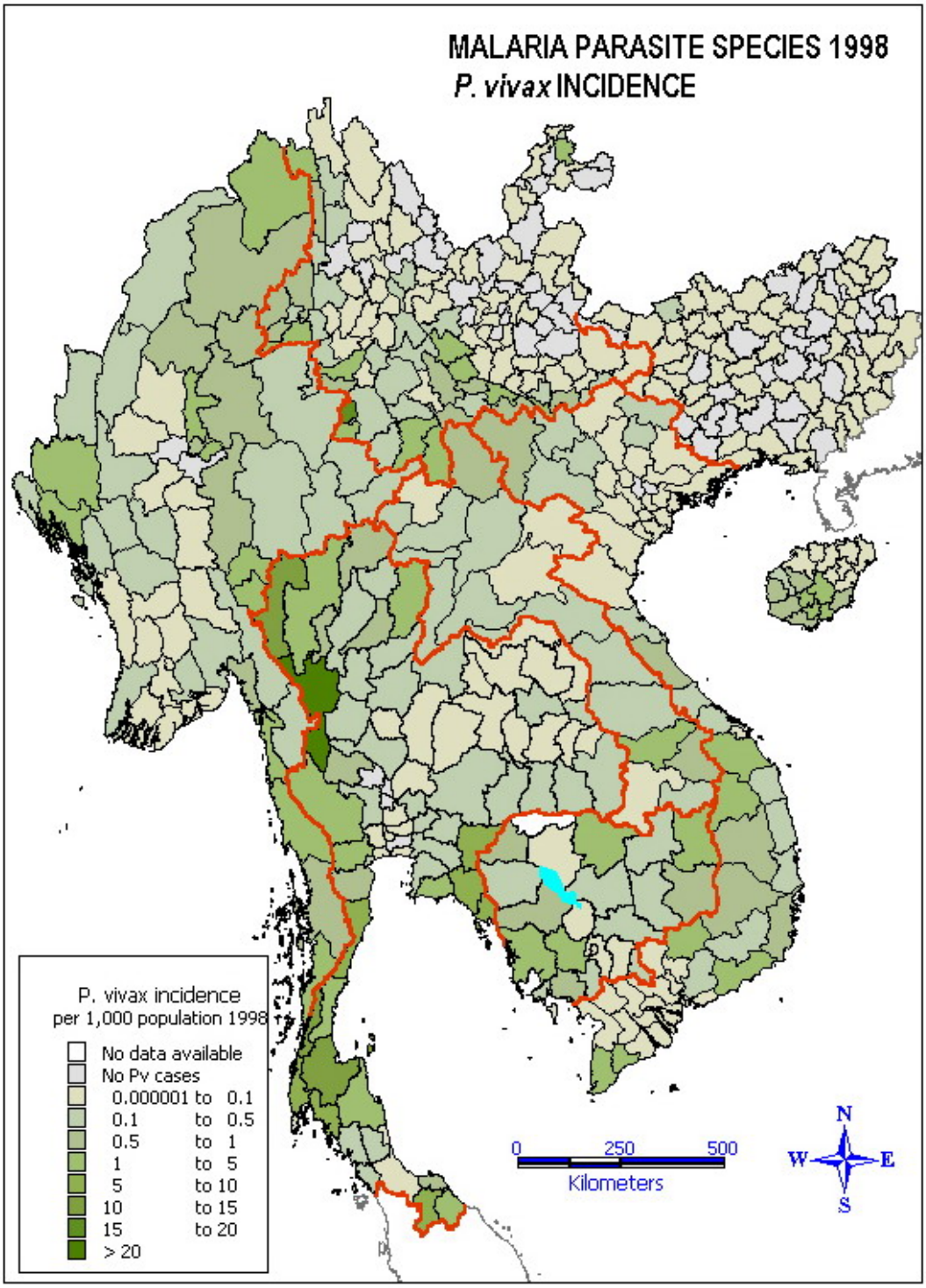
MALARIA PARASITE SPECIES 1998
P. vivax INCIDENCE
P. vivax incidence
per 1,000 population 1998
No data available
No Pv cases
0.000001 to 0.1
0.1 to 0.5
0.5 to 1
1 to 5
5 to 10
10 to 15
15 to 20
> 20
0 250 500
Kilometers
N
W E
S

Figure 17c.