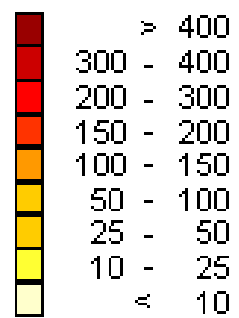
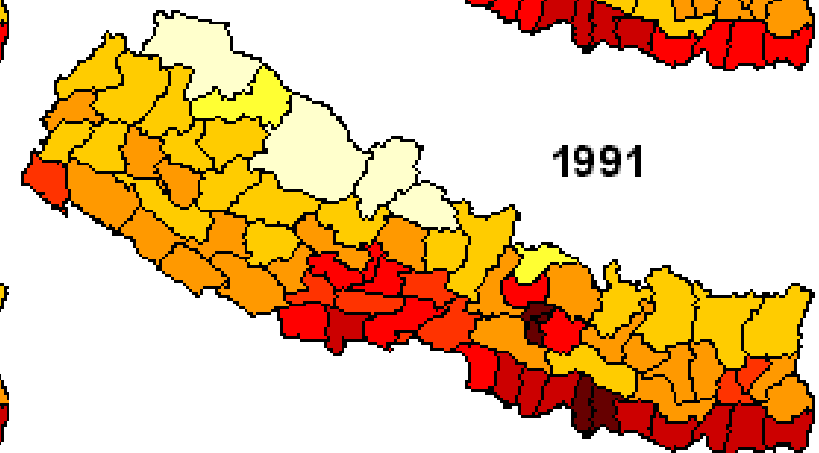
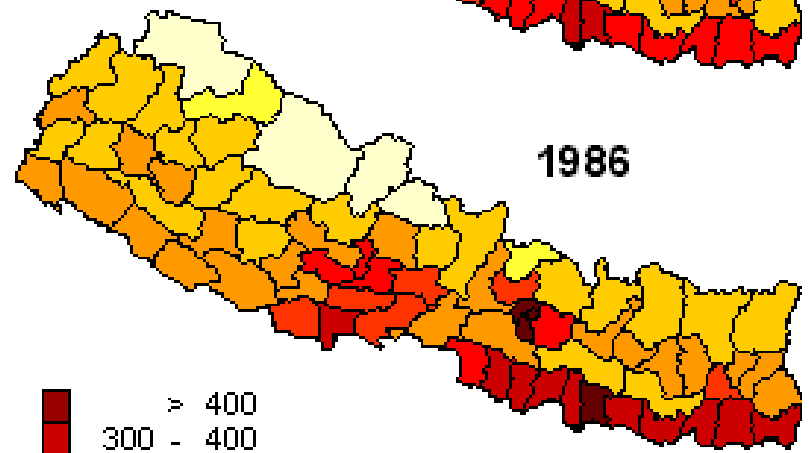
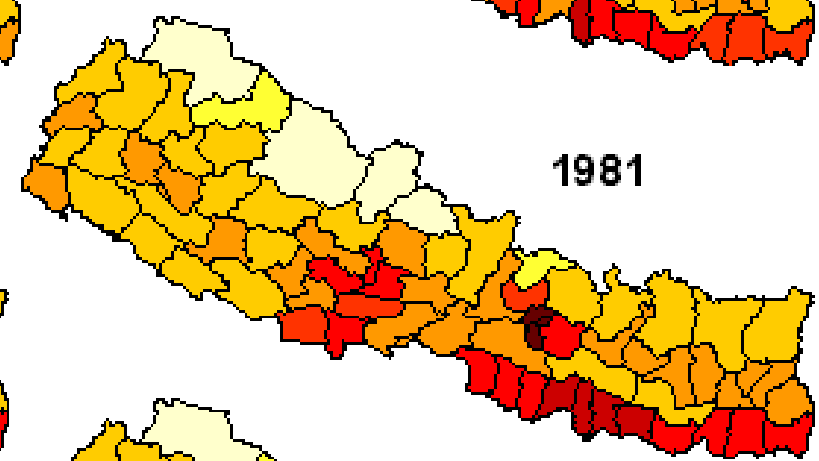
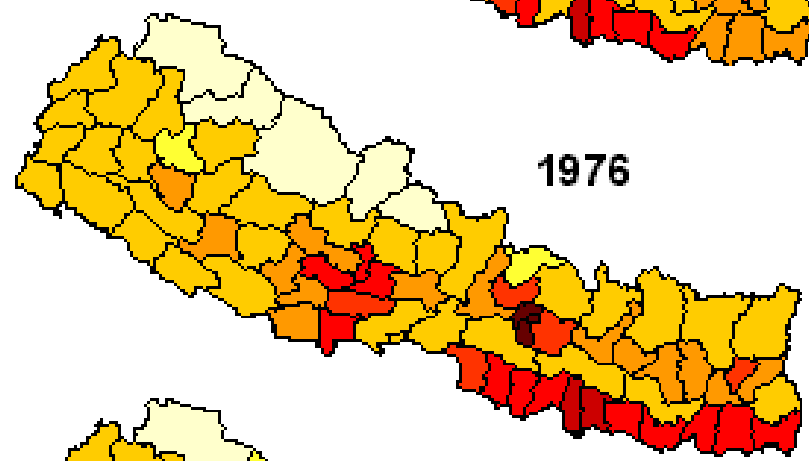
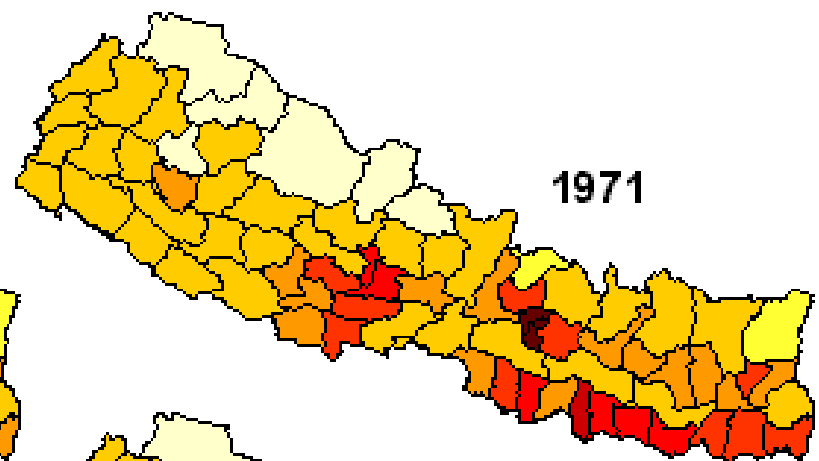


Example applications

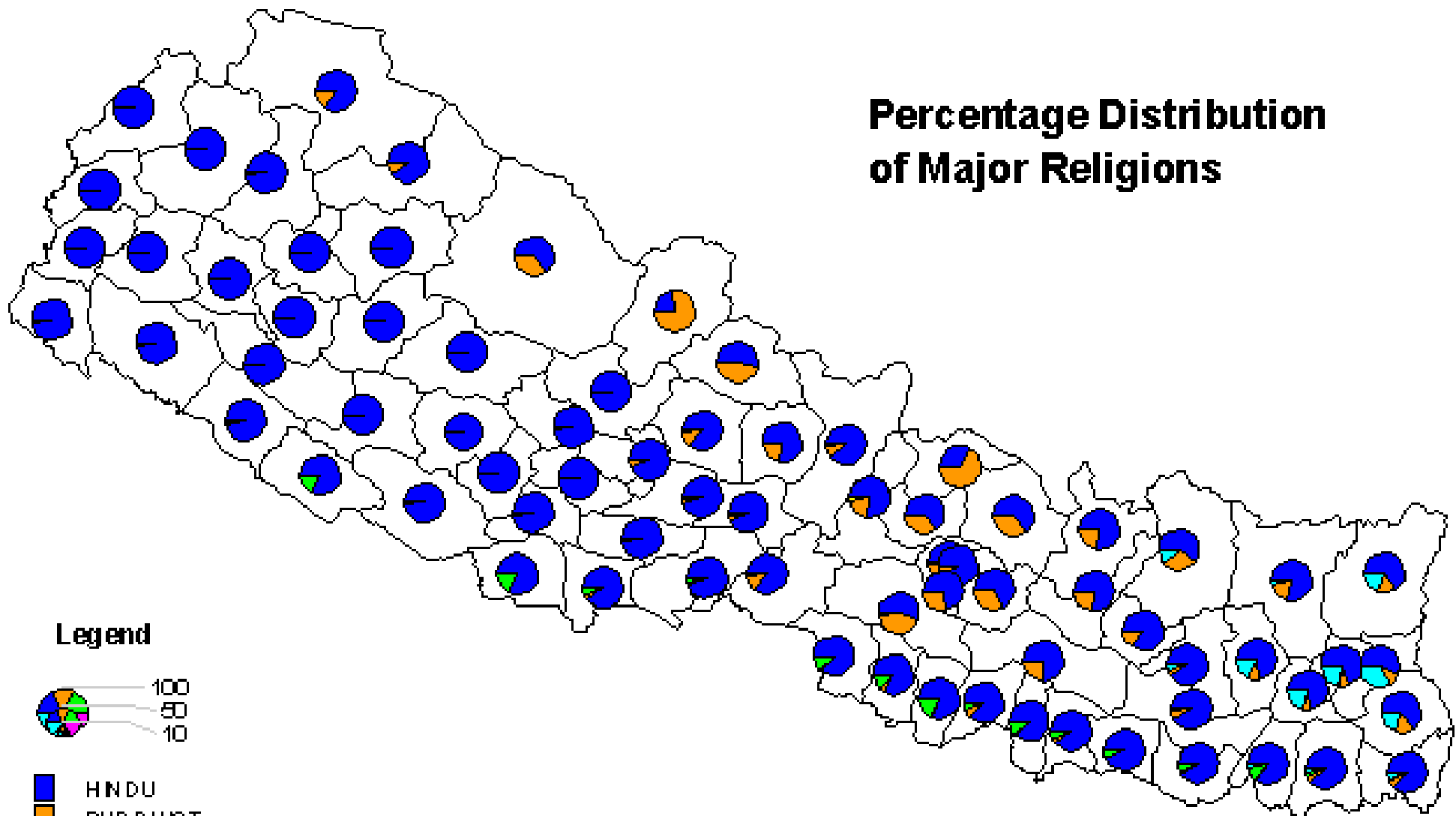
Presentation of census data and related information

Case study: Nepal

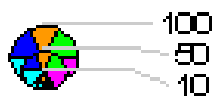


Population Density
People / sqkm

Percentage Distribution of Major Religions



Legend

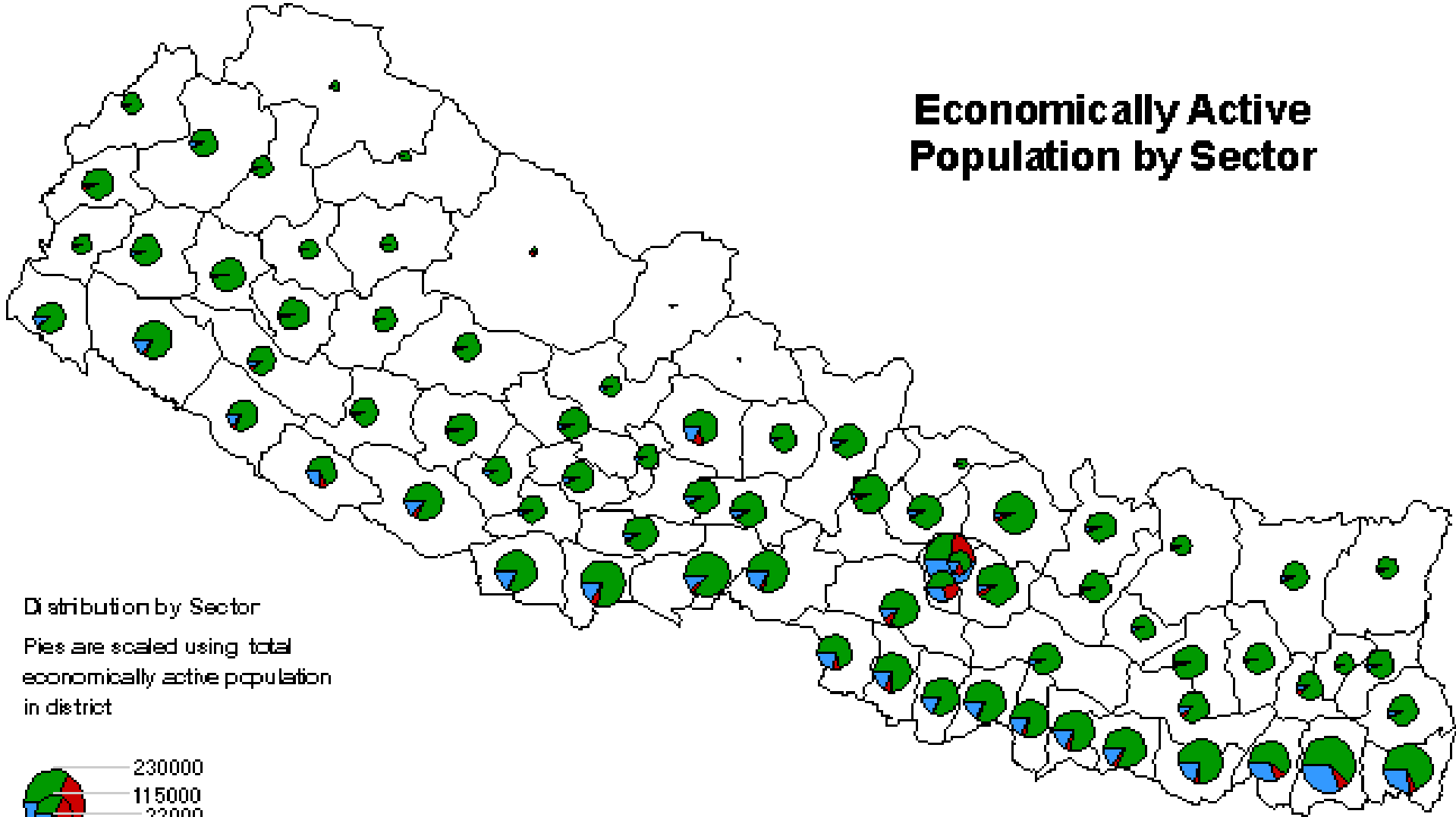


- HINDU
- BUDDHIST
- MUSLIM
- JAIN
- CHRISTIAN
- KIRATI

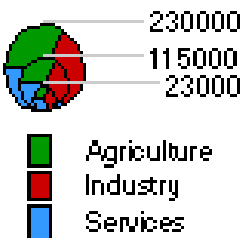
0 50 100

Kilometers

Economically Active Population by Sector



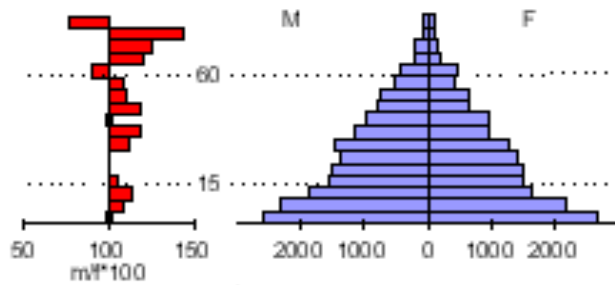
Distribution by Sector
Pies are scaled using total economically active population in district



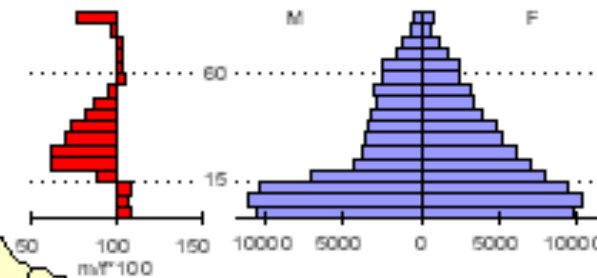
Source: Statistical Yearbook of Nepal, 1993

Sex ratios and age distribution for selected districts

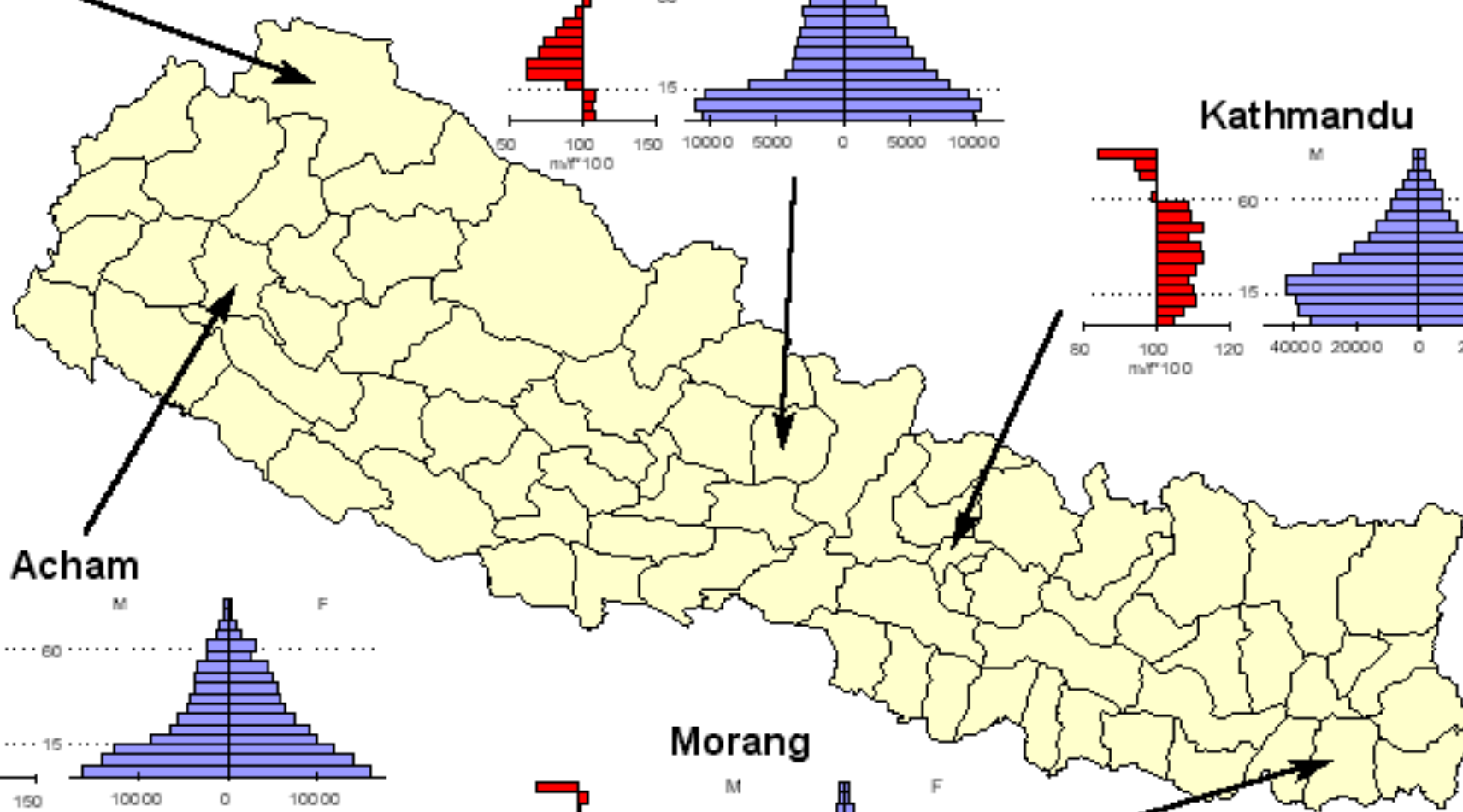
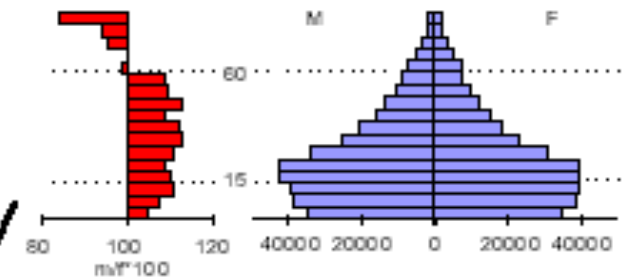
Humla



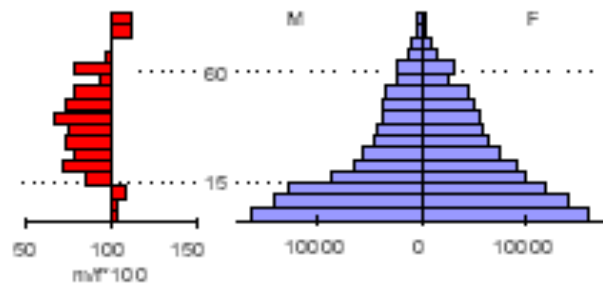
Lamjung



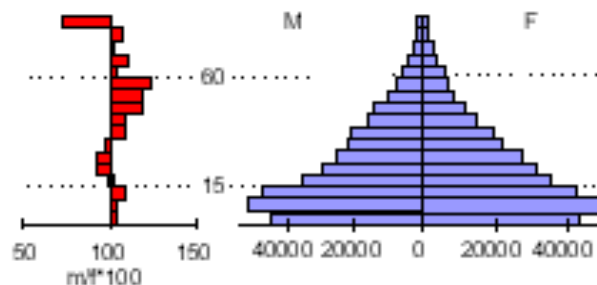
Kathmandu



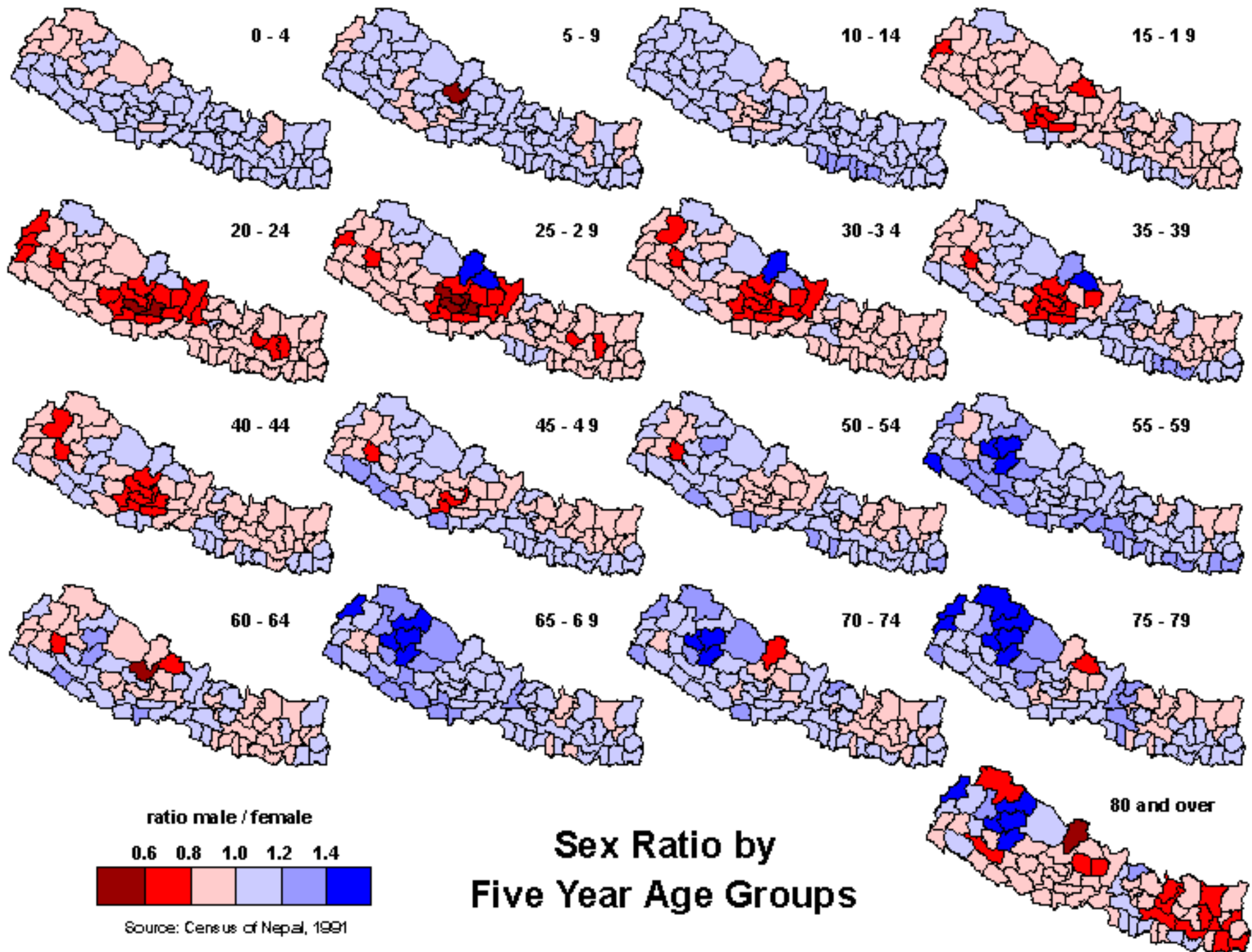
Acham



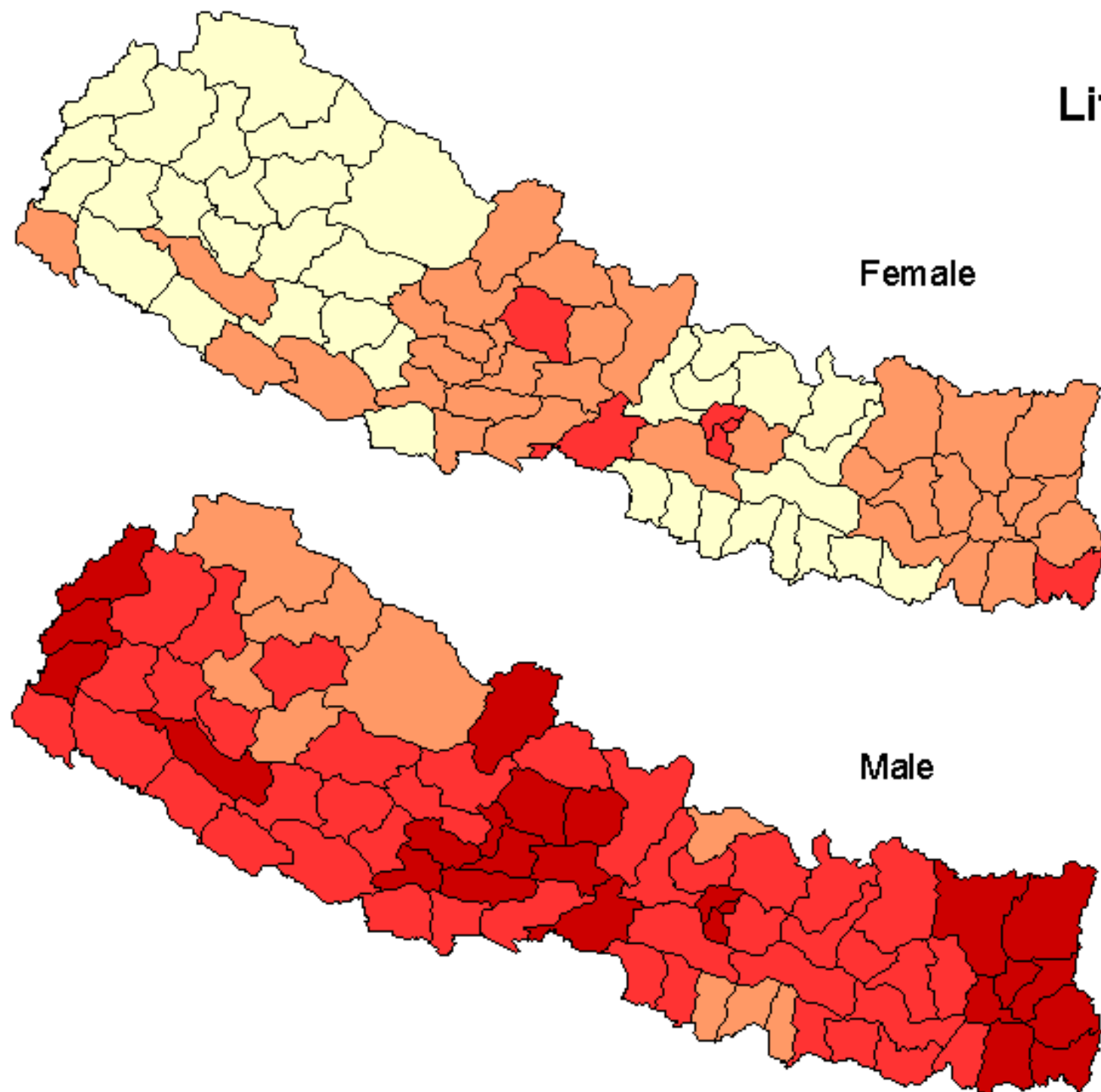
Morang



Source: Census of Nepal, 1991



Literacy Rates

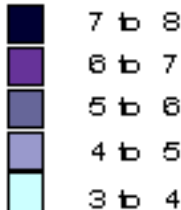


Total Fertility Rate (estimated)

1991

1986

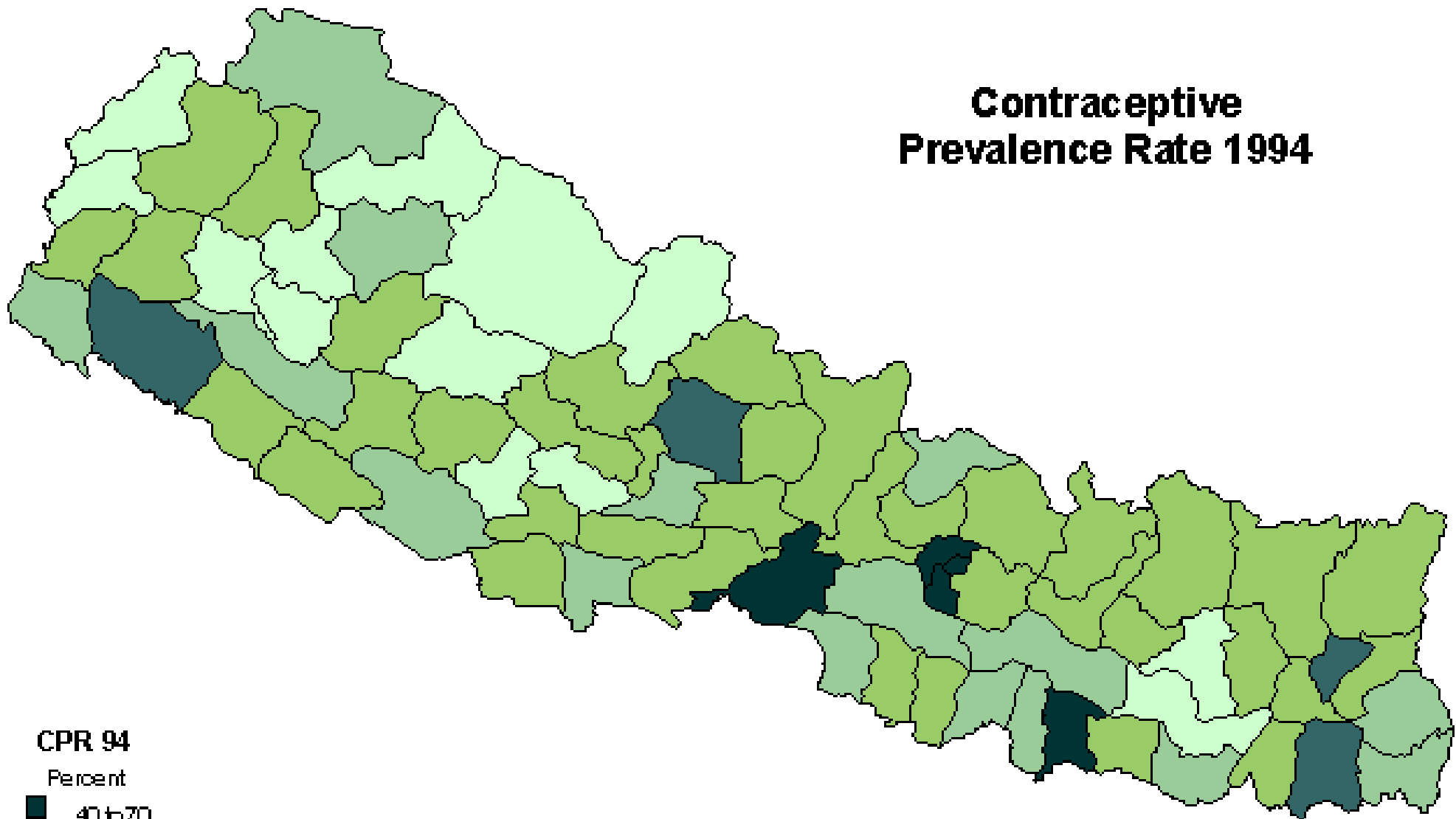
TFR



0 50 100
Kilometers

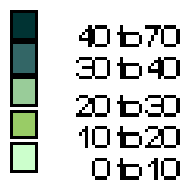
Source: Rele's method
based on Census of 1991

Contraceptive Prevalence Rate 1994



CPR 94

Percent

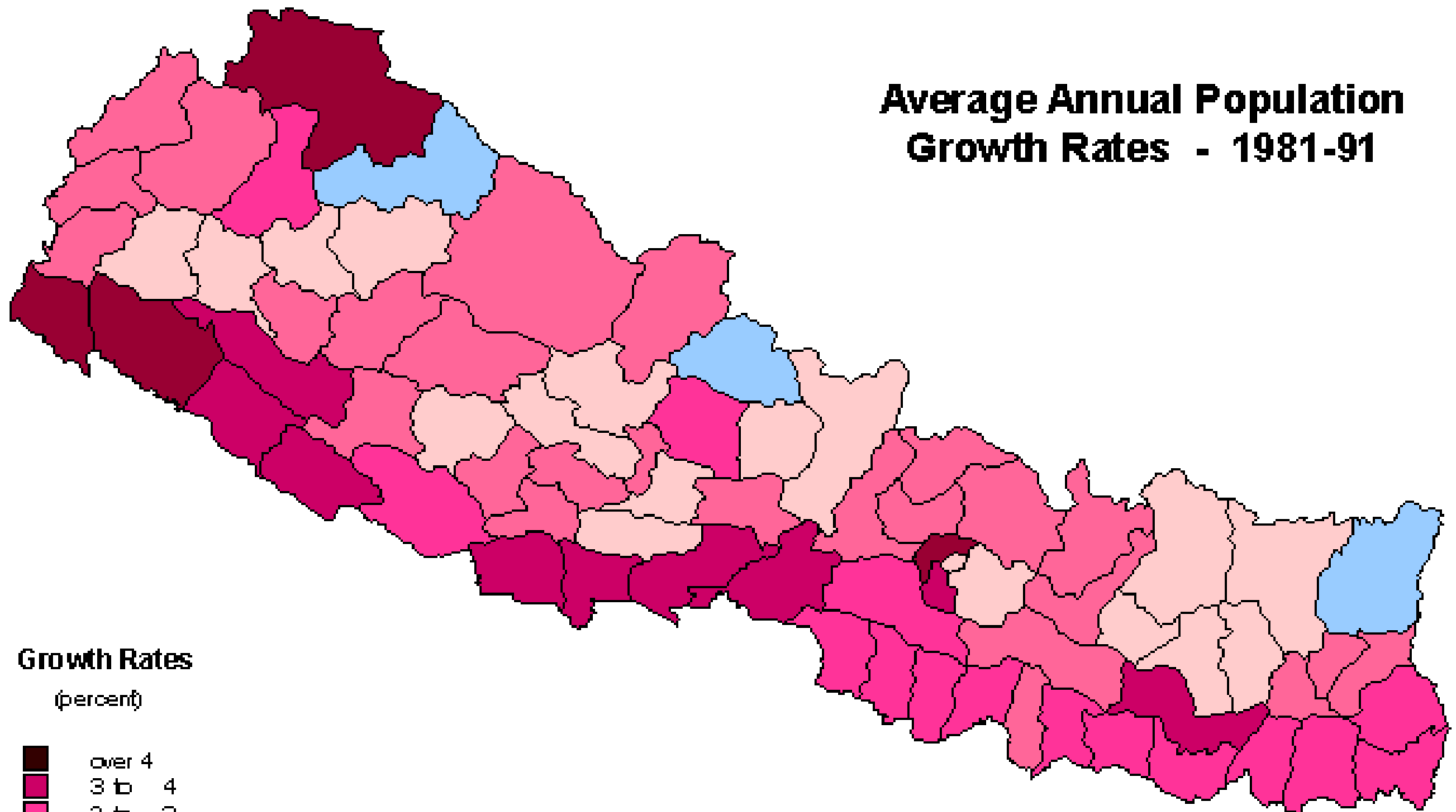


0 50 100

Kilometers

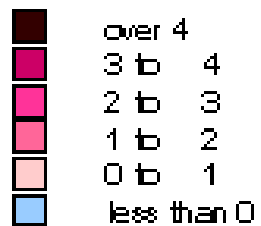
Source: Department of Health Services, HMG Nepal, 1994

Average Annual Population Growth Rates - 1981-91



Growth Rates

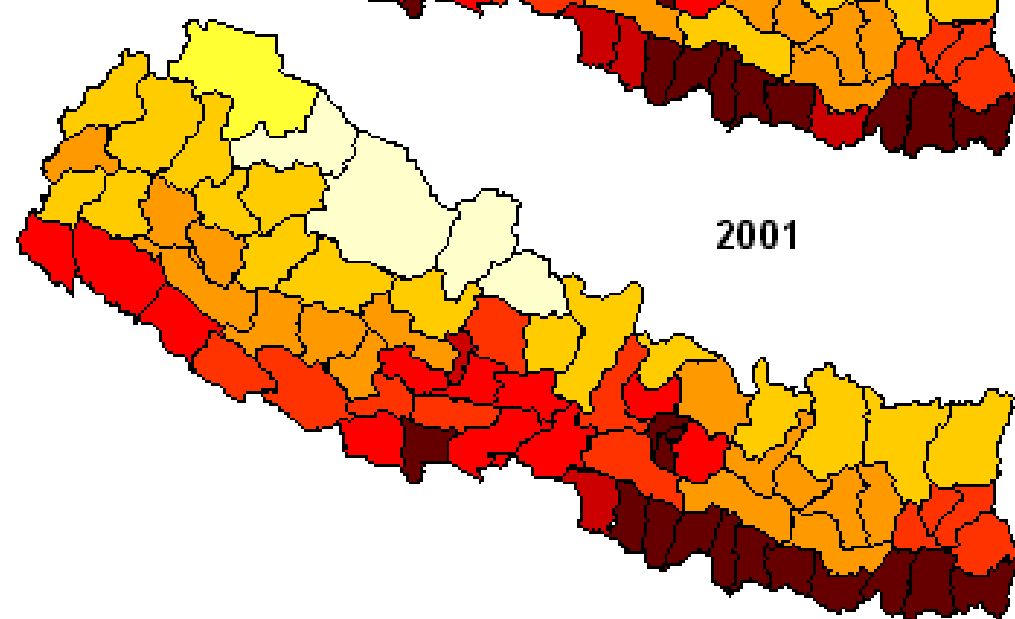
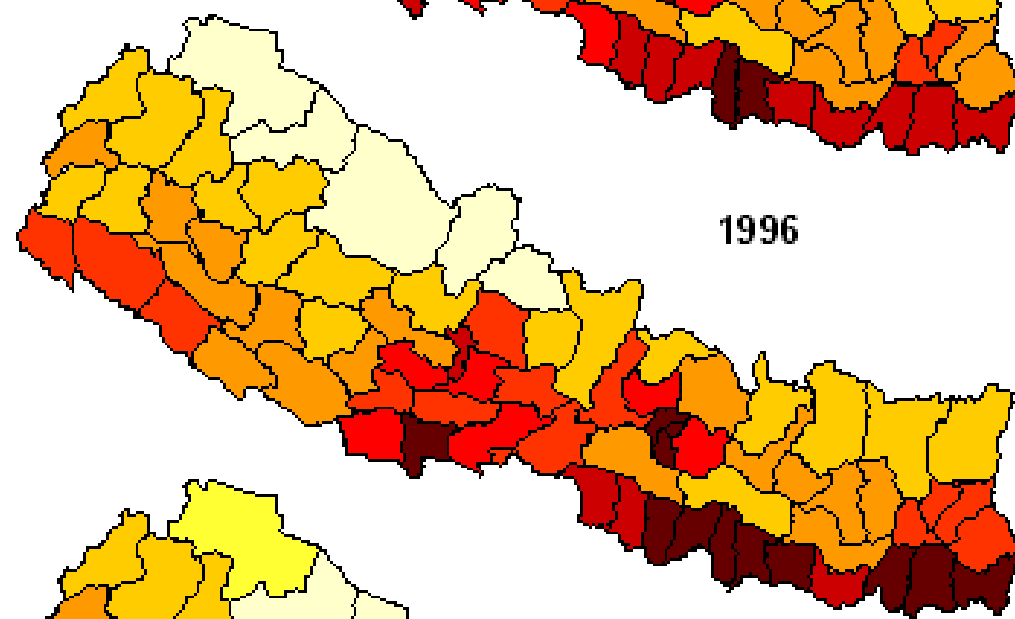
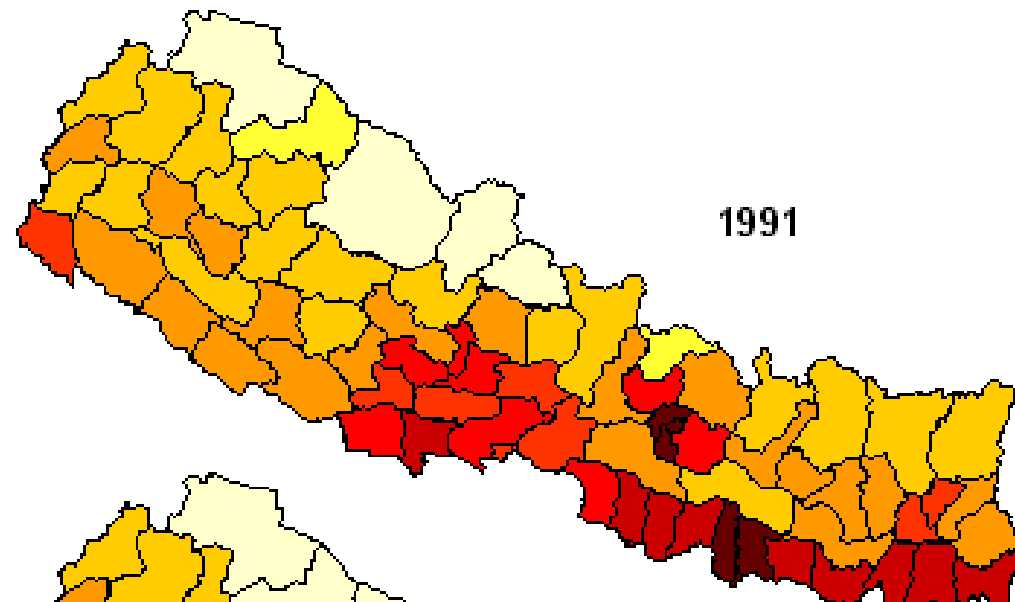
(percent)



Source: Statistical Yearbook of Nepal, 1993

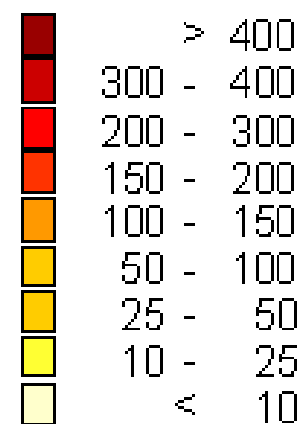
0 50 100

Kilometers



Population Density

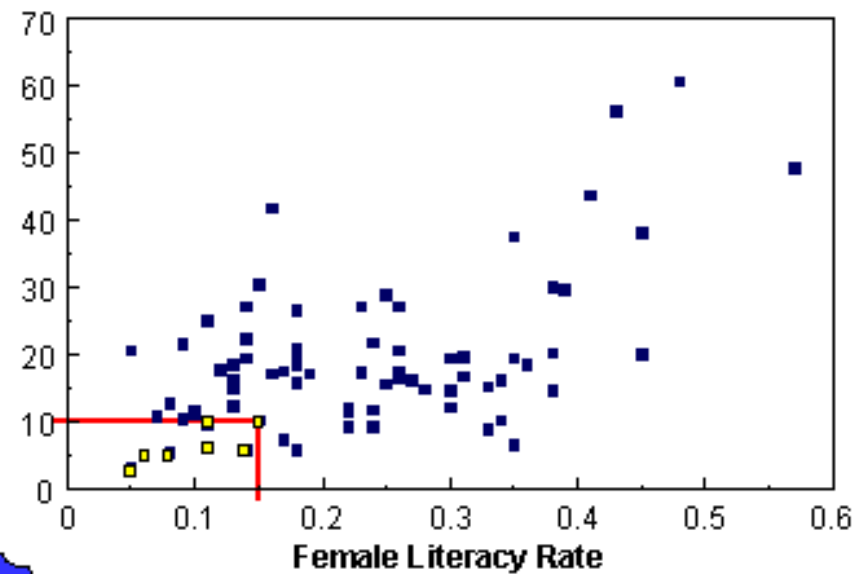
People / sqkm



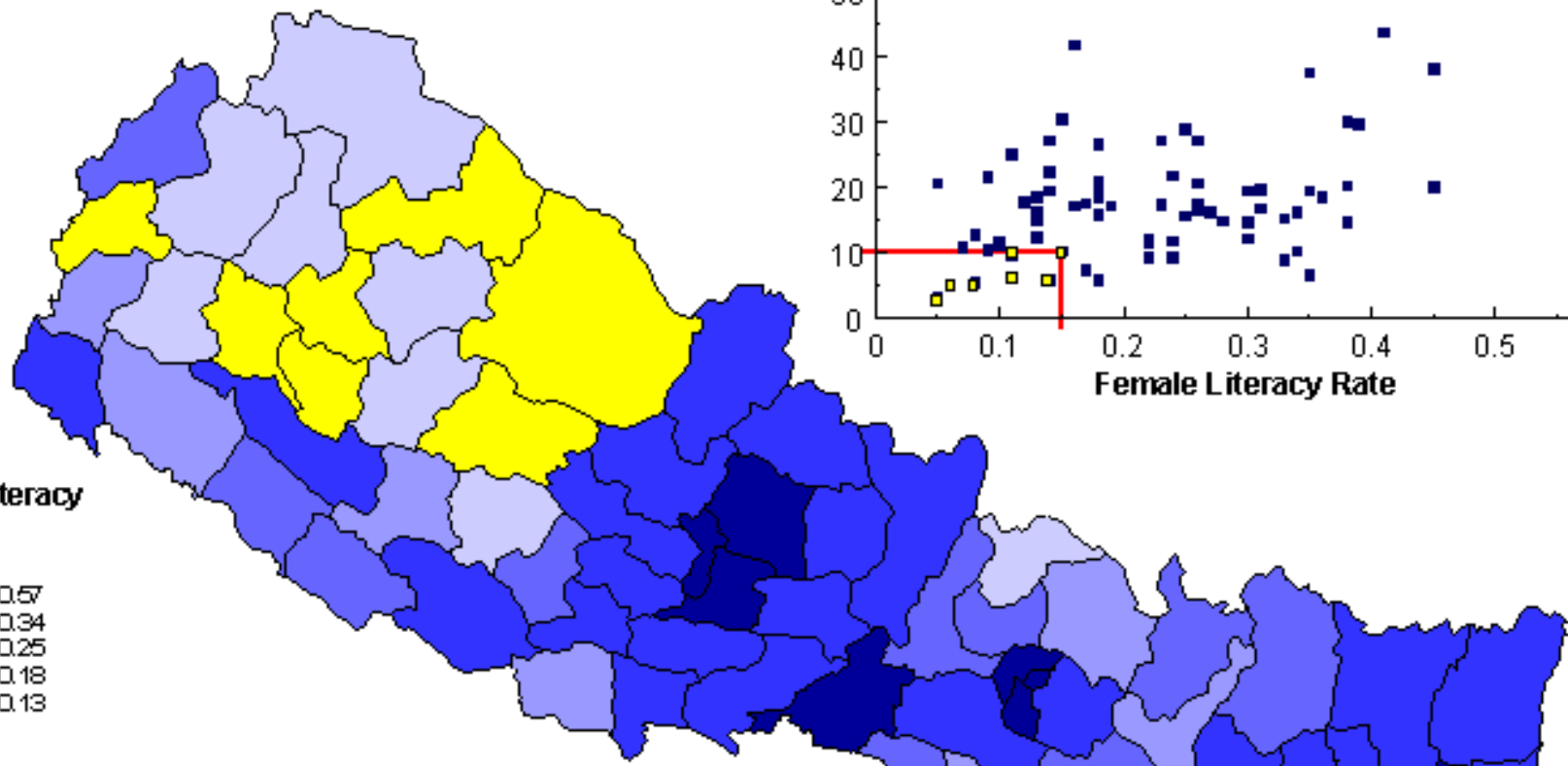
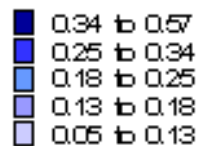
Supporting the analysis of census and related information

Bivariate Analysis: CPR and Female Literacy Rate

Contraceptive Prevalence Rate (%)



Female Literacy Rate

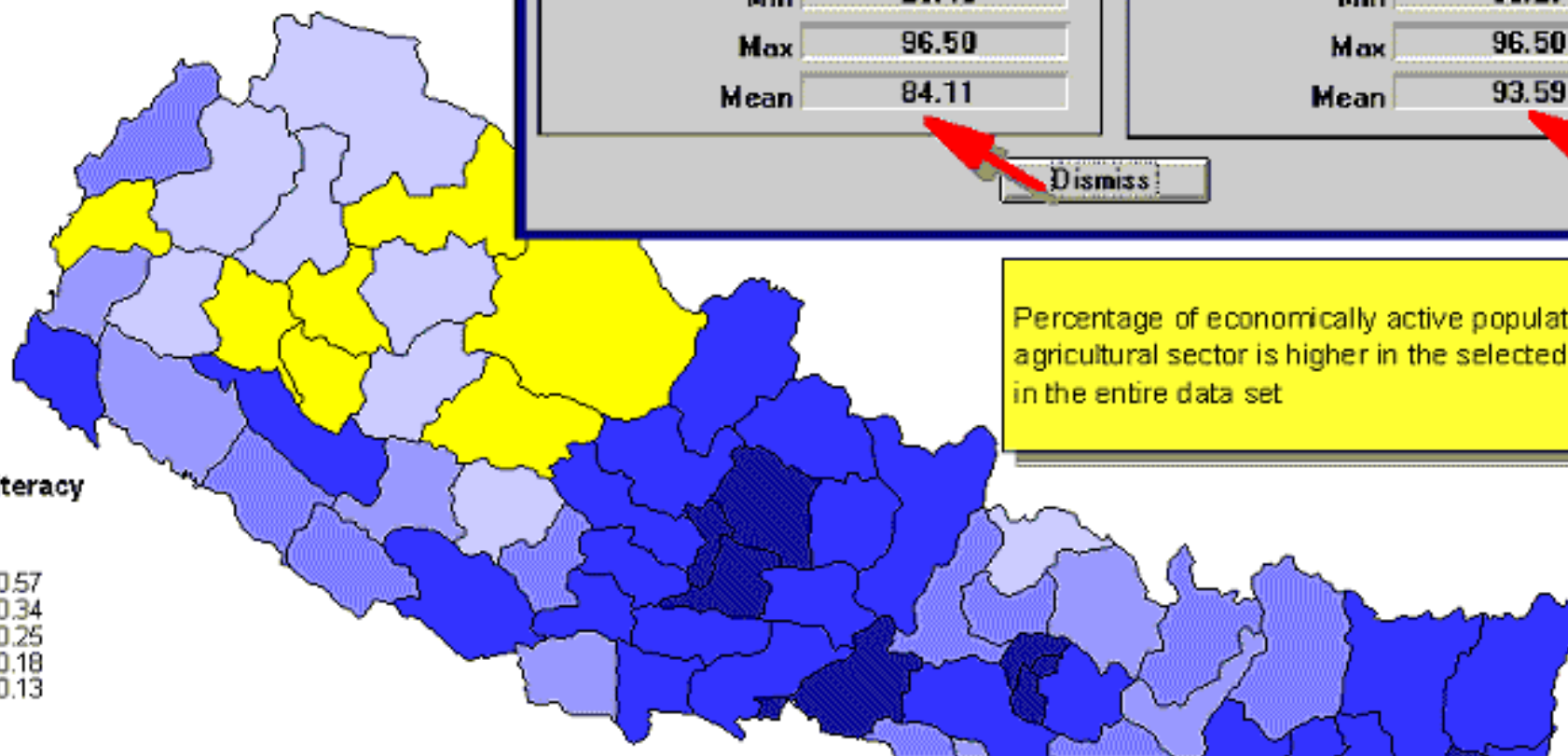


Female literacy rate							
All							
Selected							
[femlitr < 0.15] and [cpr94 < 10]							
	devreg	zone	dist	sqkm	pop71	pop81	
10	MIDWEST	Karnali	Kalikot	1741	10017.00	87638.00	+
11	FAR WEST	Seti	Doti	2025	166070.00	153135.00	
12	FAR WEST	Seti	Achham	1680	132212.00	185212.00	
13	MIDWEST	Bheri	Dailekh	1502	156072.00	166527.00	
14	MIDWEST	Bheri	Jajarkot	2230	86564.00	99312.00	
15	MIDWEST	Rapti	Rukum	2877	96243.00	132432.00	
16	MIDWEST	Rapti	Salyan	1462	141457.00	152063.00	

Multivariate Analysis: Rural versus Urban

Item: Kind:

Records		Selected Records	
Count	<input type="text" value="75"/>	Count	<input type="text" value="7"/>
Sum	<input type="text" value="6308.23"/>	Sum	<input type="text" value="655.15"/>
Min	<input type="text" value="25.46"/>	Min	<input type="text" value="90.27"/>
Max	<input type="text" value="96.50"/>	Max	<input type="text" value="96.50"/>
Mean	<input type="text" value="84.11"/>	Mean	<input type="text" value="93.59"/>



Percentage of economically active population in the agricultural sector is higher in the selected set than in the entire data set

Female Literacy Rate

- 0.34 to 0.57
- 0.25 to 0.34
- 0.18 to 0.25
- 0.13 to 0.18
- 0.05 to 0.13

Female literacy rate

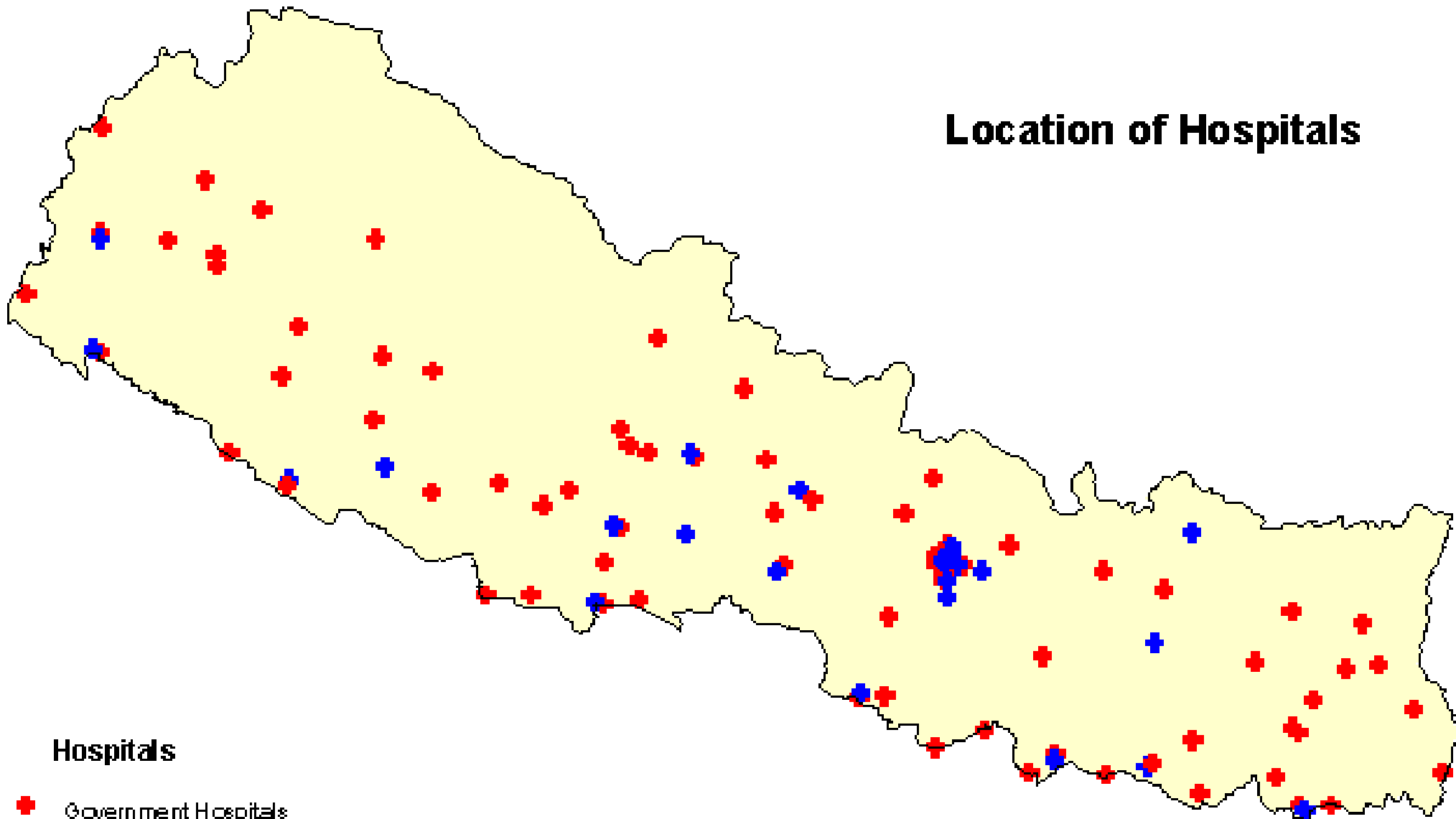
All Selected

[femlitr < 0.15] and [cpi94 < 10]

	infish	product	othlab	aglab	indlab	servlab	hindu	bu
10	47908.00	978.00	158	95.01	1.94	2.55	99.89	+
11	79221.00	1774.00	2444	89.64	2.01	5.05	99.67	
12	107456.00	576.00	451	96.50	0.52	2.34	99.84	
13	85680.00	1126.00	1133	93.87	1.23	3.42	99.76	
14	56663.00	1004.00	297	95.16	1.69	2.58	99.85	
15	71639.00	1591.00	431	93.69	2.08	3.55	99.70	
16	66207.00	2034.00	391	91.92	2.82	4.36	99.71	

Modeling of spatial data

Location of Hospitals



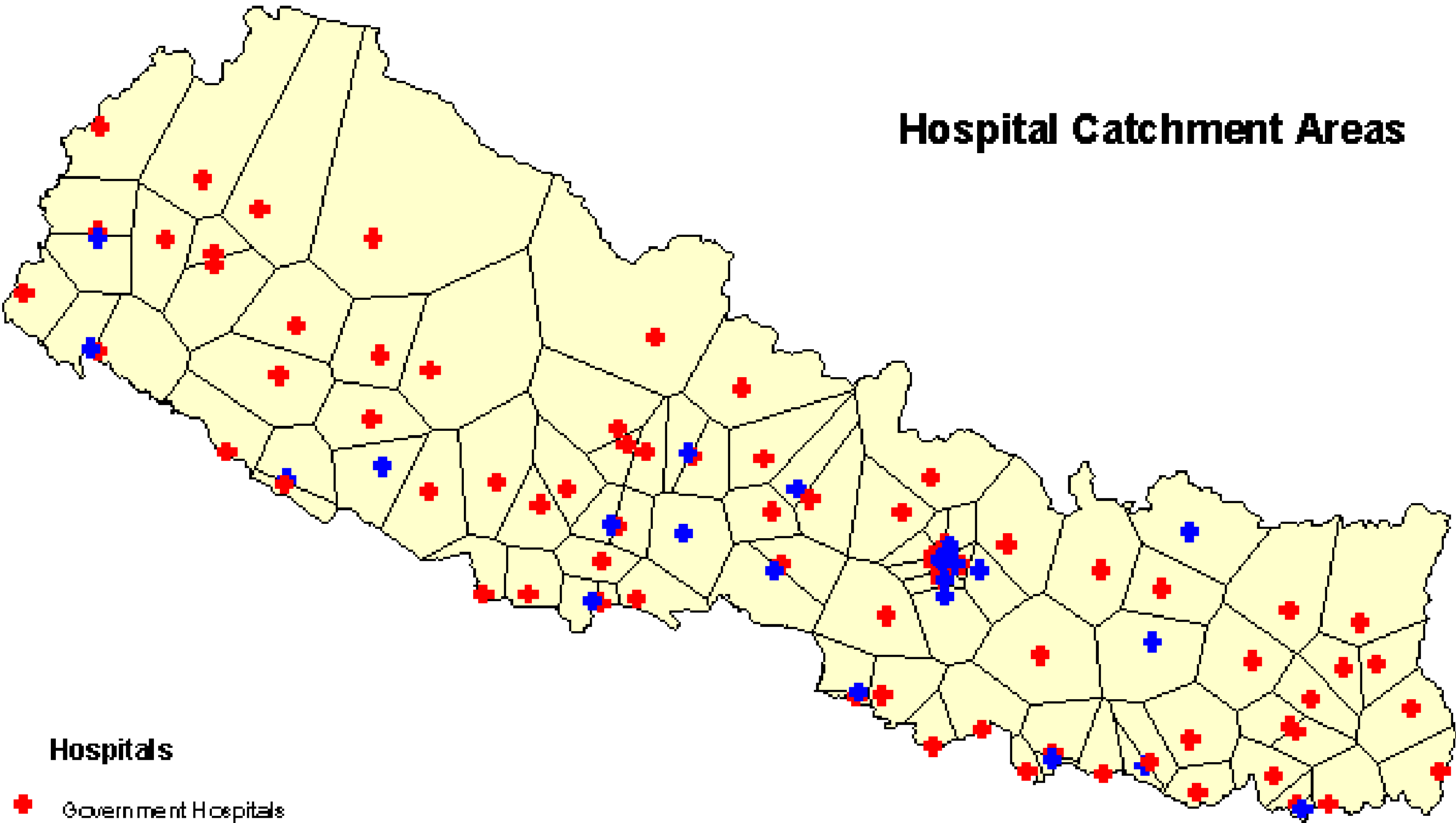
Hospitals

- ✚ Government Hospitals
- ✚ Private Hospitals

Source: UNFPA, 1991



Hospital Catchment Areas



Hospitals

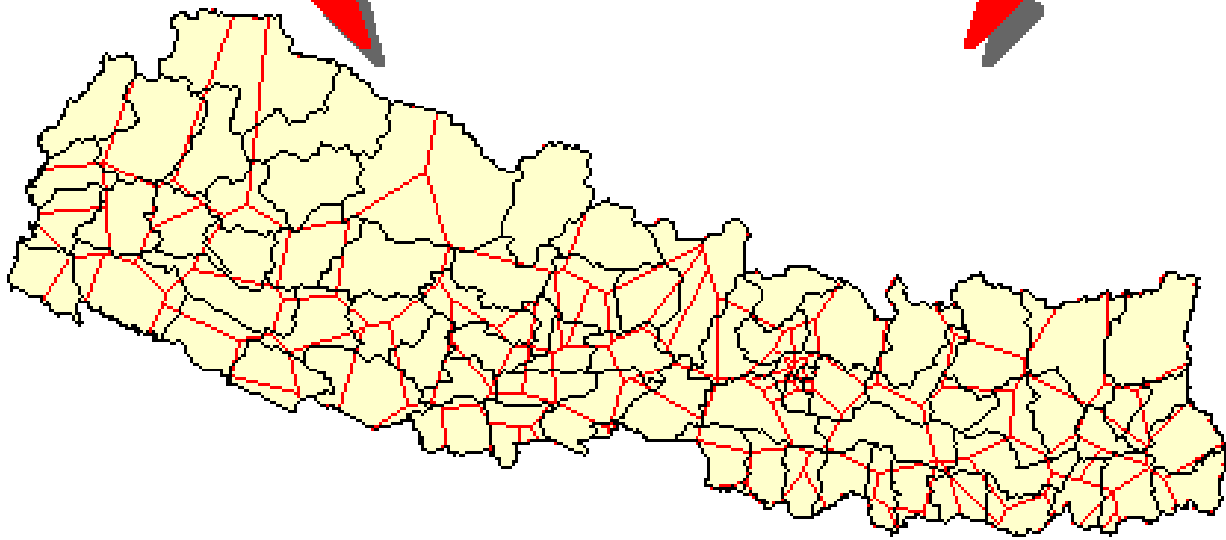
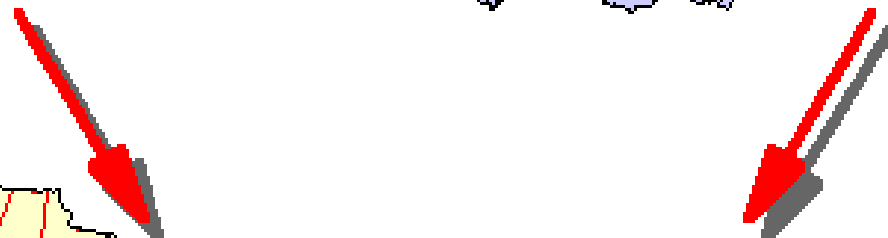
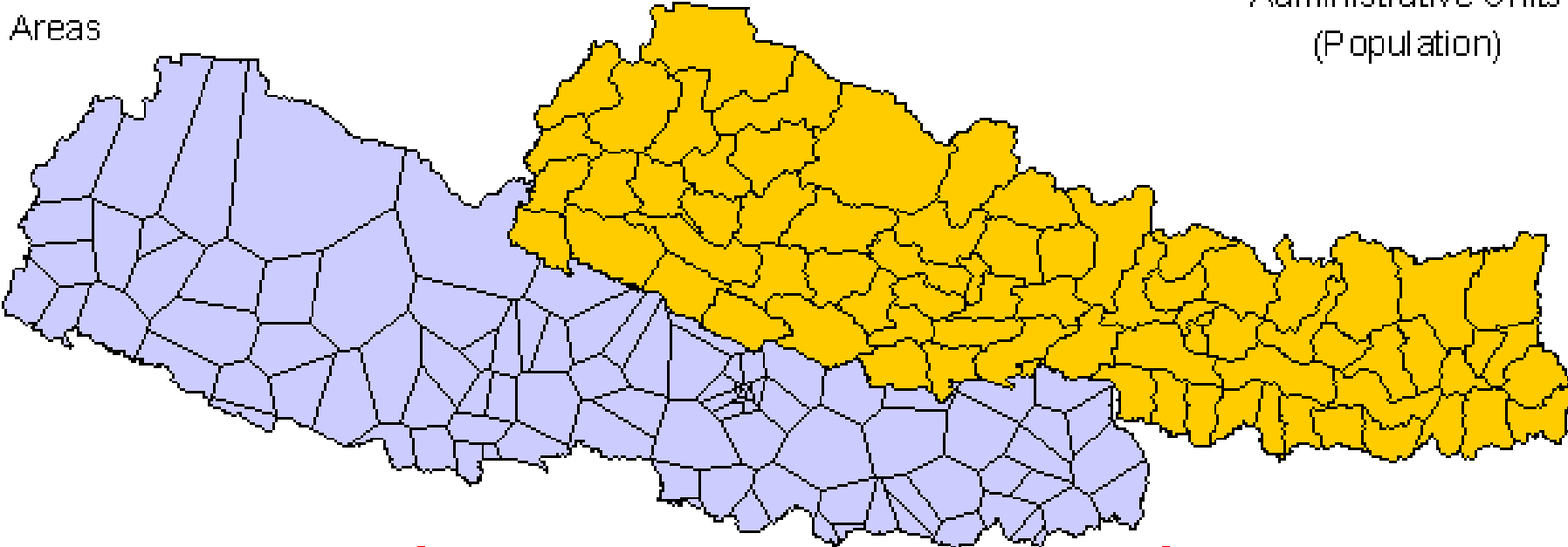
- Government Hospitals
- Private Hospitals

Source: UNFPA, 1991



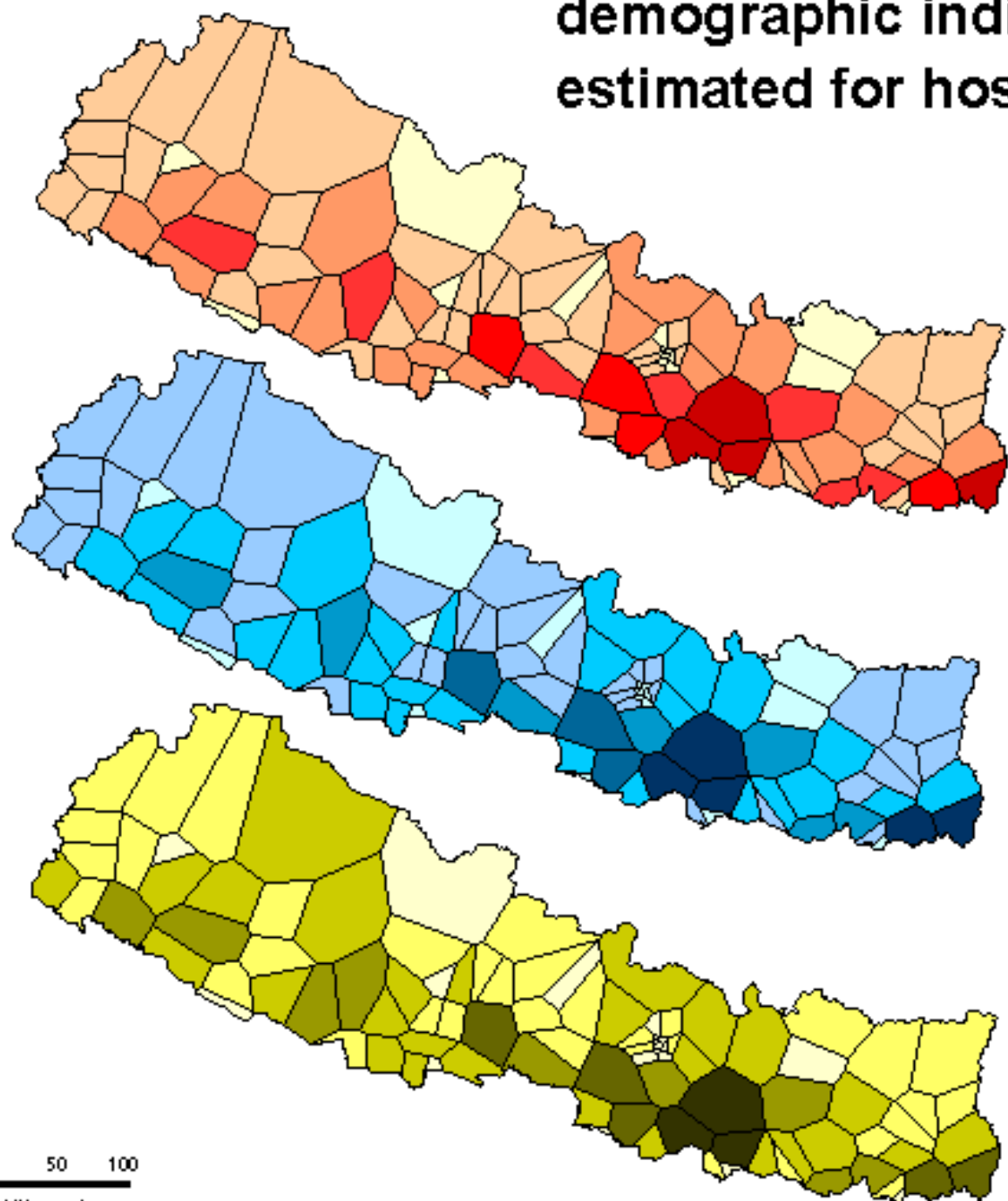
Hospital Service
Areas

Administrative Units
(Population)

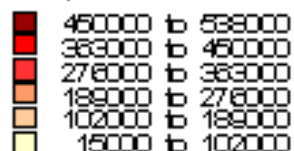


Overlay (Areas of Overlap)

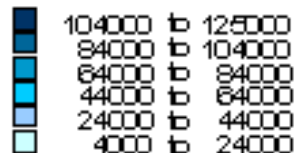
Using the areas of overlap as weights, demographic indicators can be estimated for hospital catchment areas



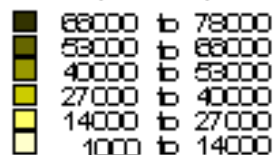
Number of people per
hospital 1991



Number of women in
reproductive age per hospital



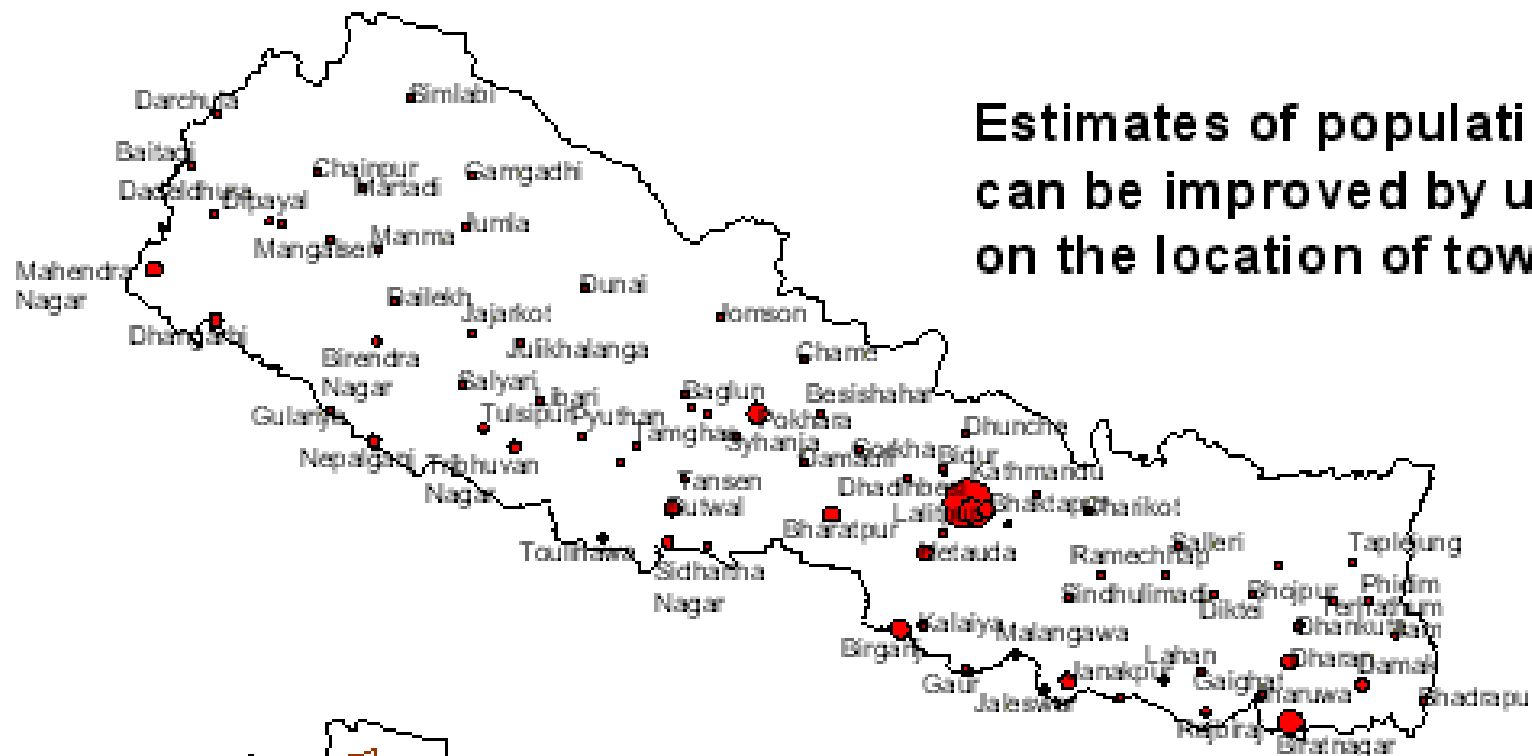
Number of children aged
0 to 4 per hospital



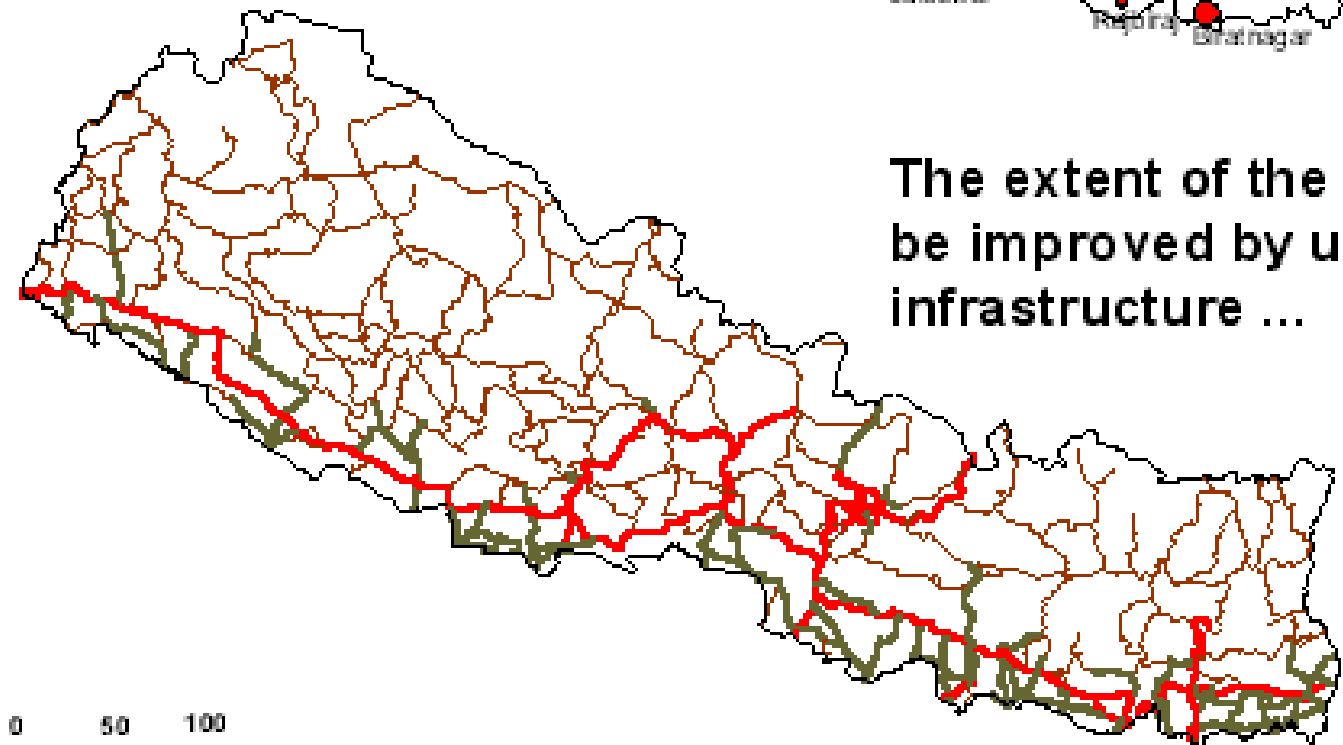
0 50 100

Kilometers

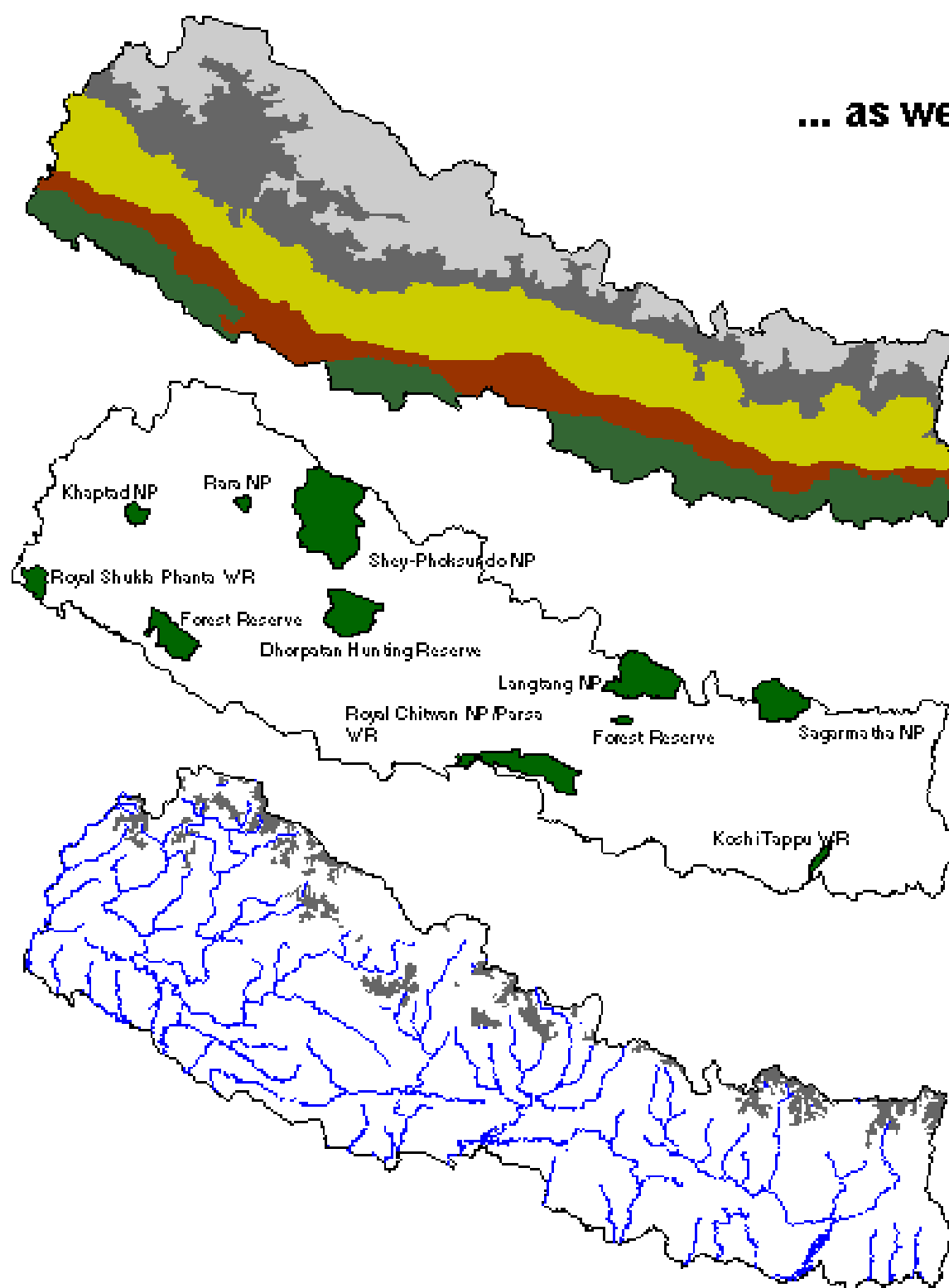
Estimates of population distribution can be improved by using information on the location of towns and cities.



The extent of the catchment areas can be improved by using information on infrastructure ...



... as well as physiographic features



Physiographic Divisions

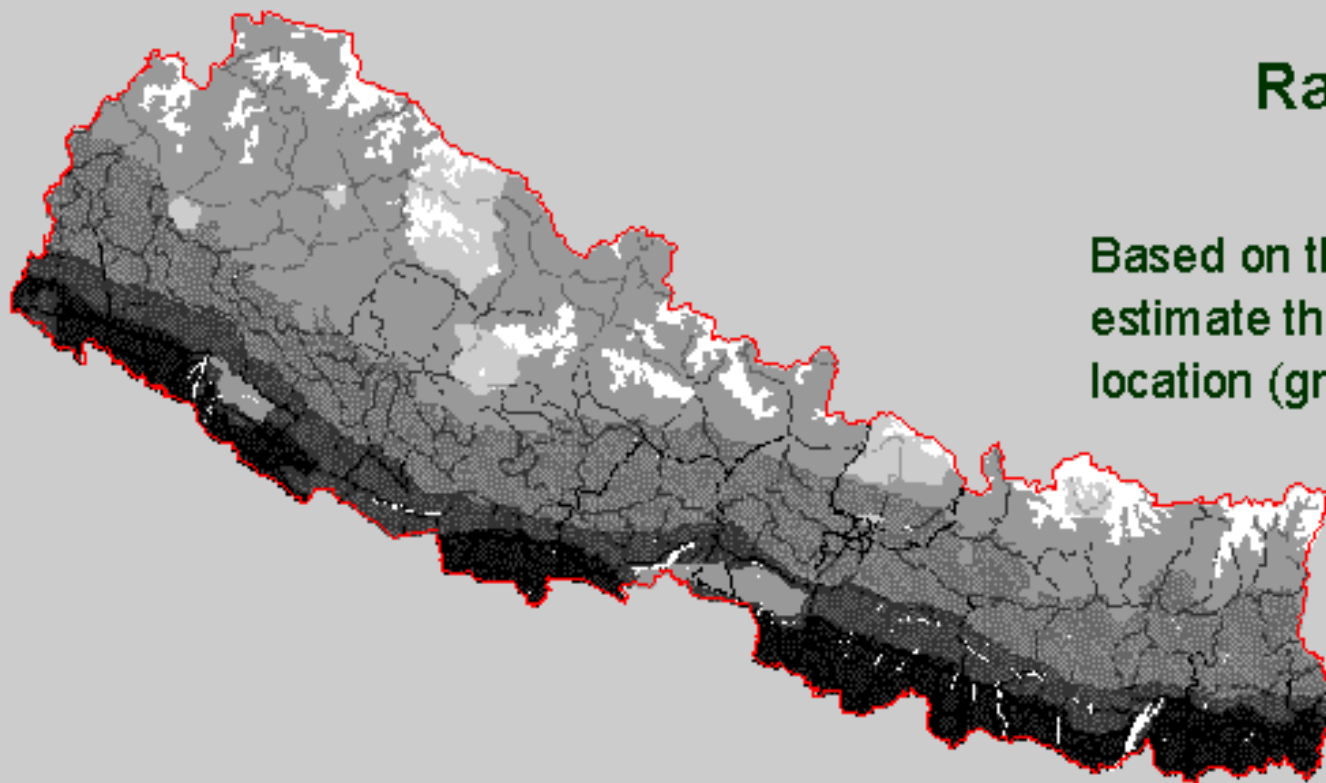
- High Himalaya
- High Mountain
- Middle Mountain
- Siwalik
- Tarai

Protected Areas and Reserves

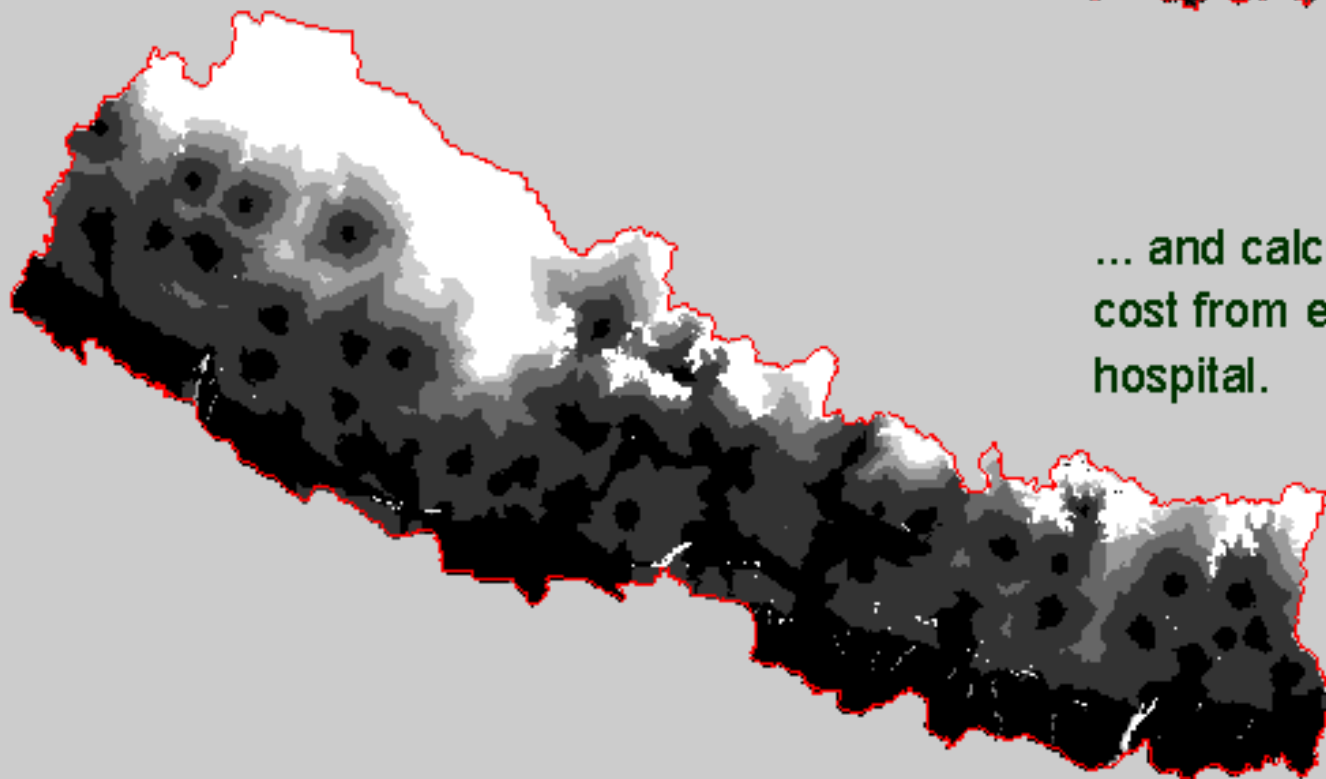
Glaciers, Rivers and Lakes

Raster Modeling

Based on the GIS layers, we can estimate the cost of traveling at each location (grid cell) ...

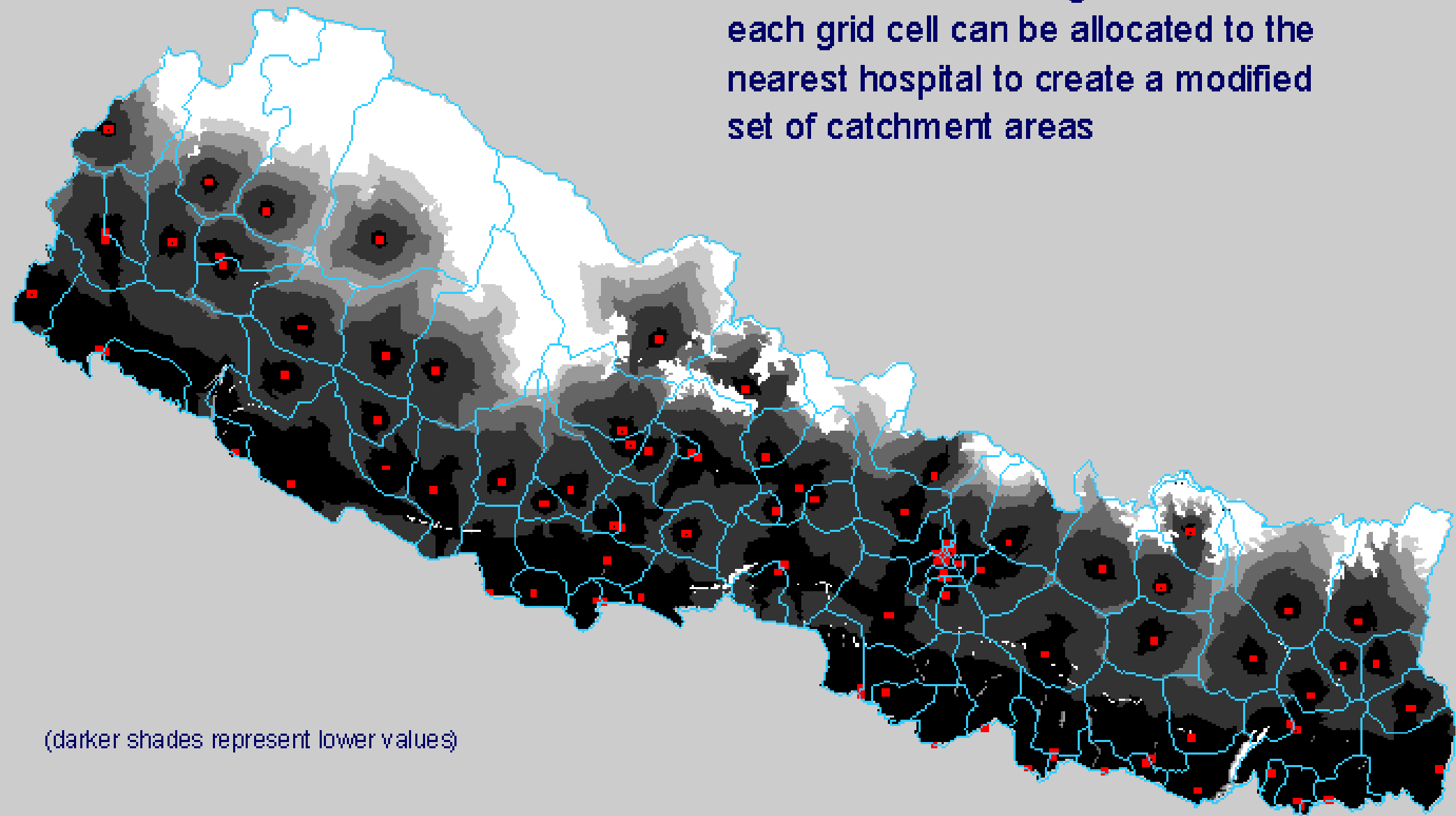


... and calculate the total travel cost from each location to the nearest hospital.

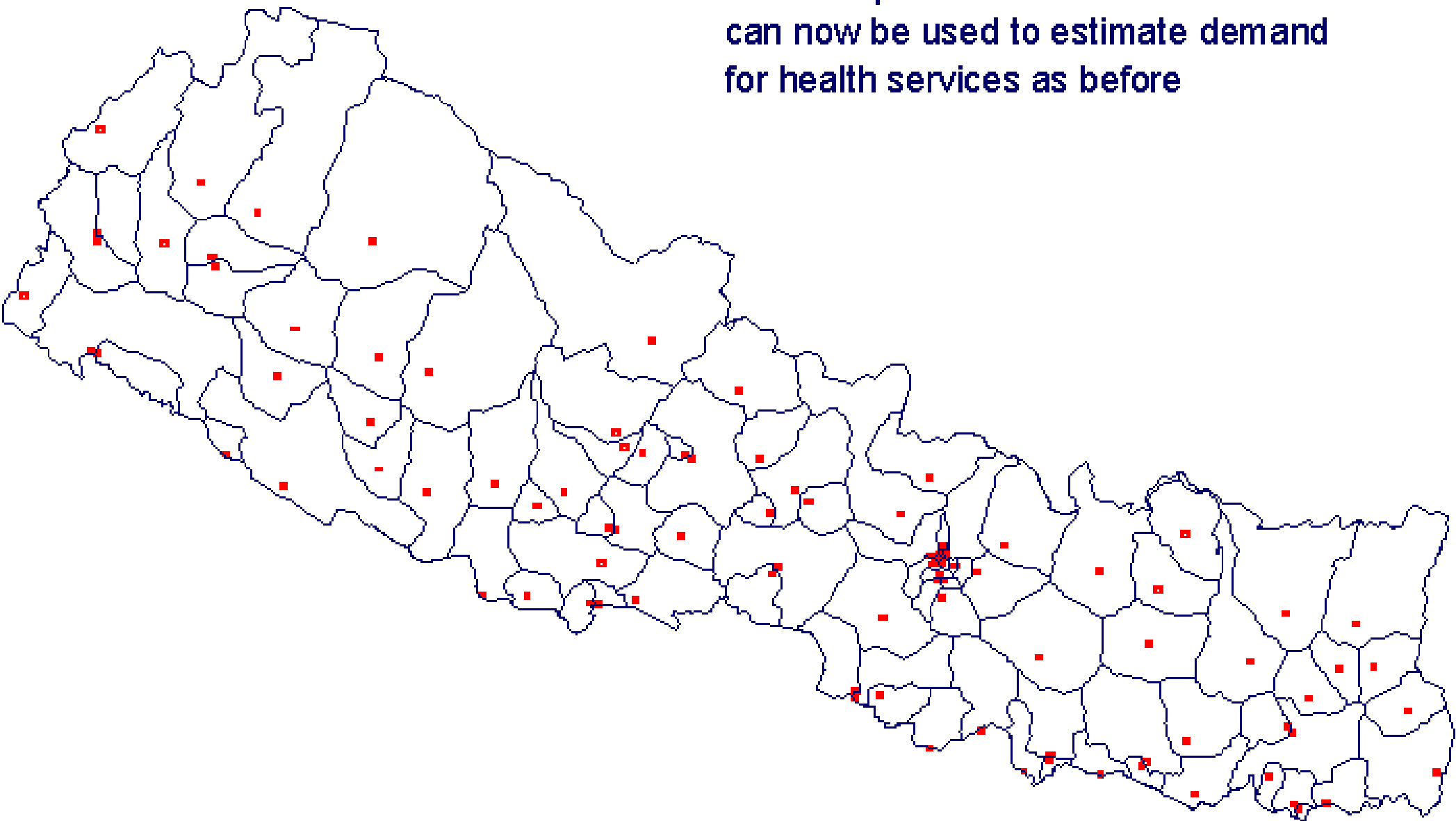


(darker shades represent lower values)

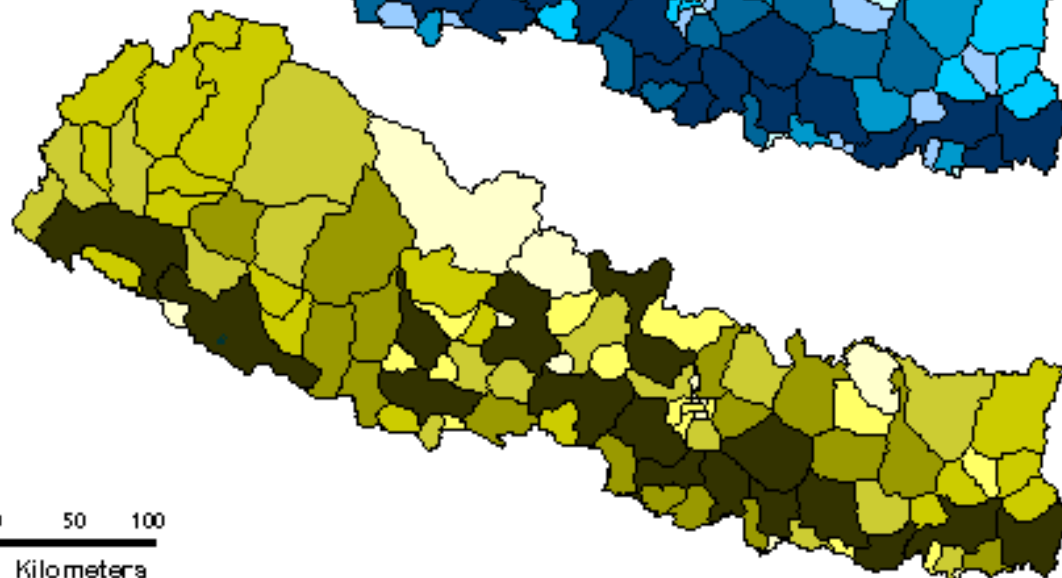
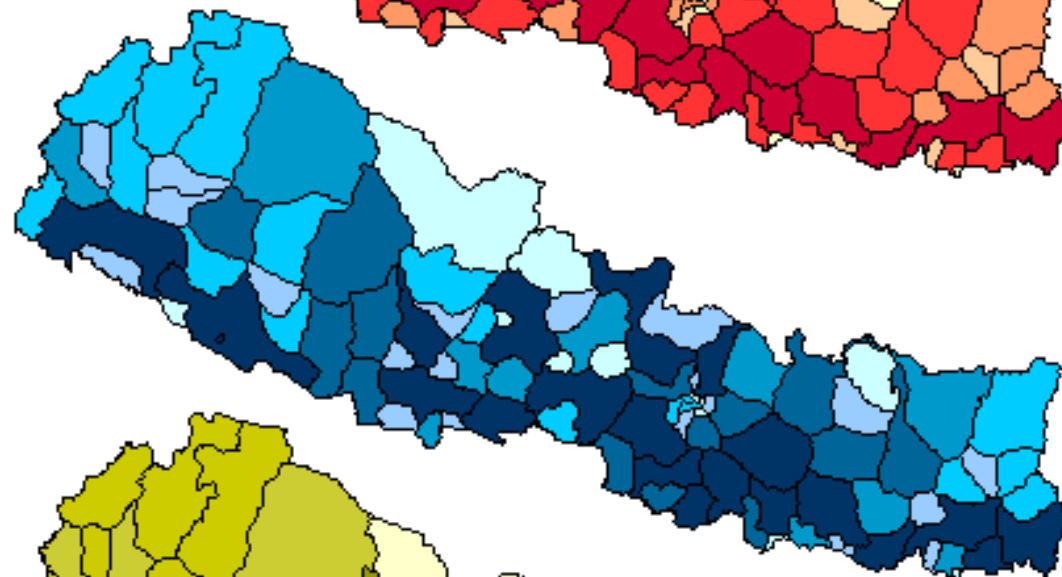
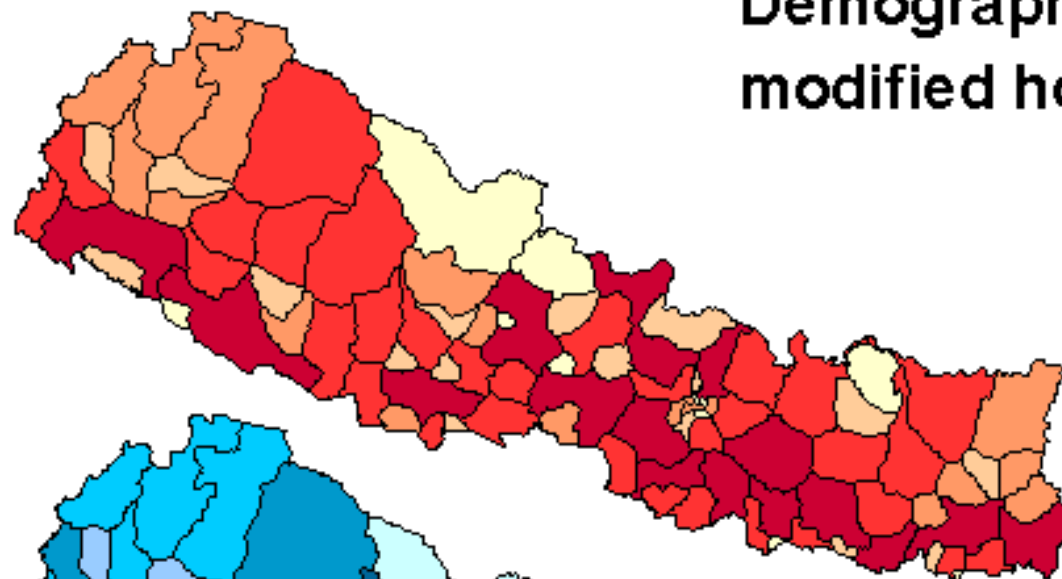
Based on the resulting cost surface, each grid cell can be allocated to the nearest hospital to create a modified set of catchment areas



**These improved catchment areas
can now be used to estimate demand
for health services as before**



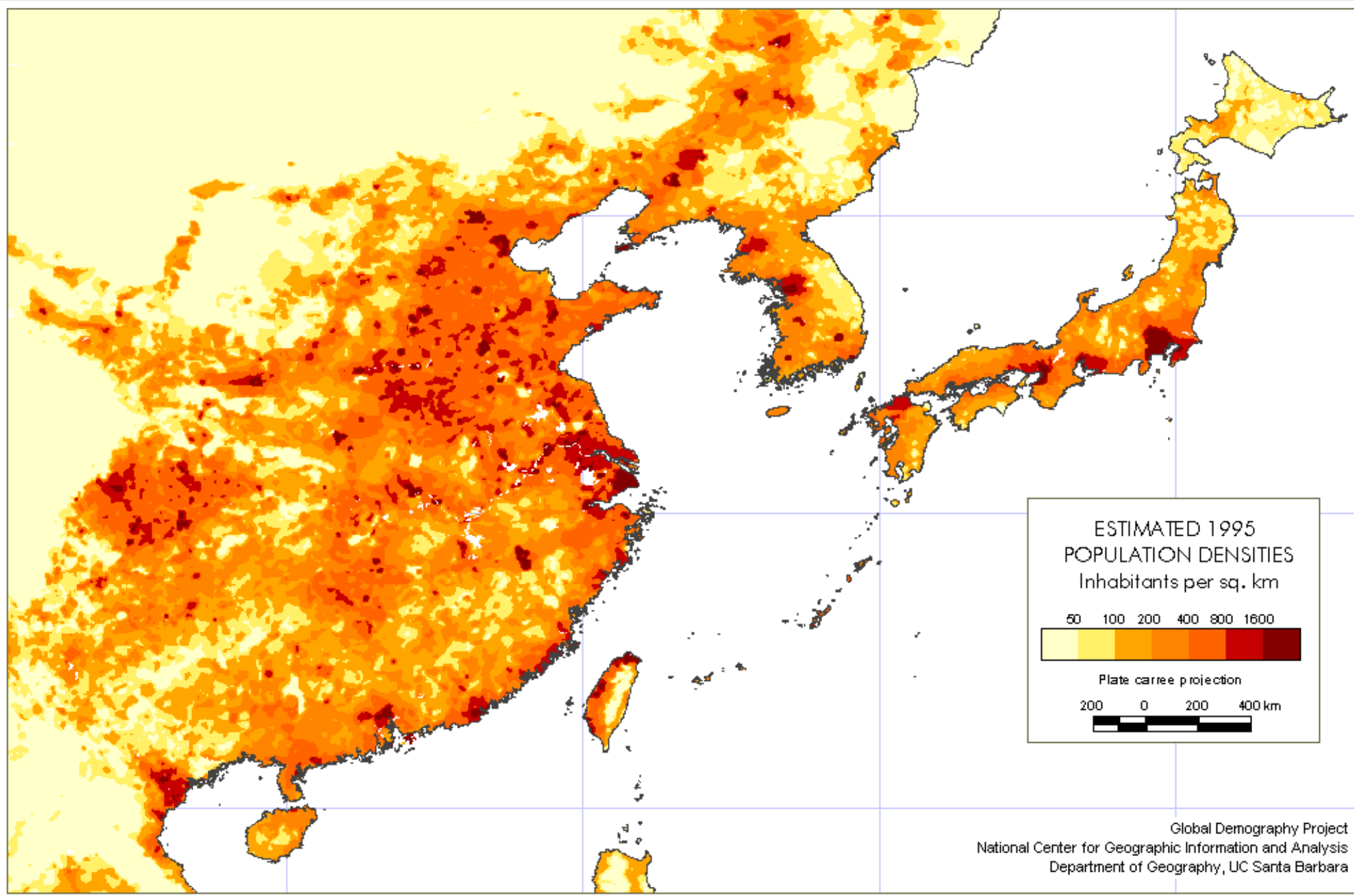
Demographic indicators for modified hospital catchment areas



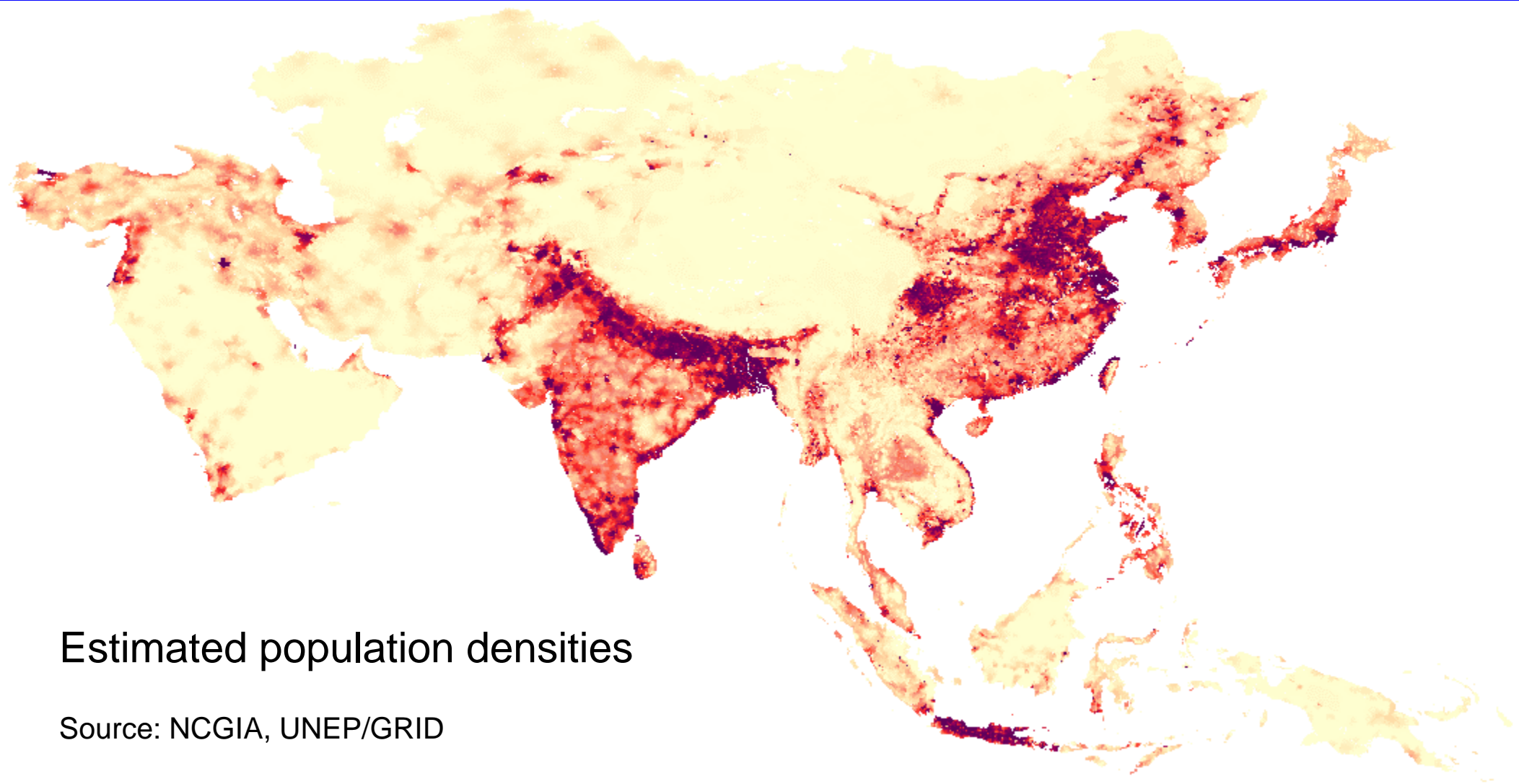
0 50 100
Kilometers

Estimating population distribution at continental and global scales



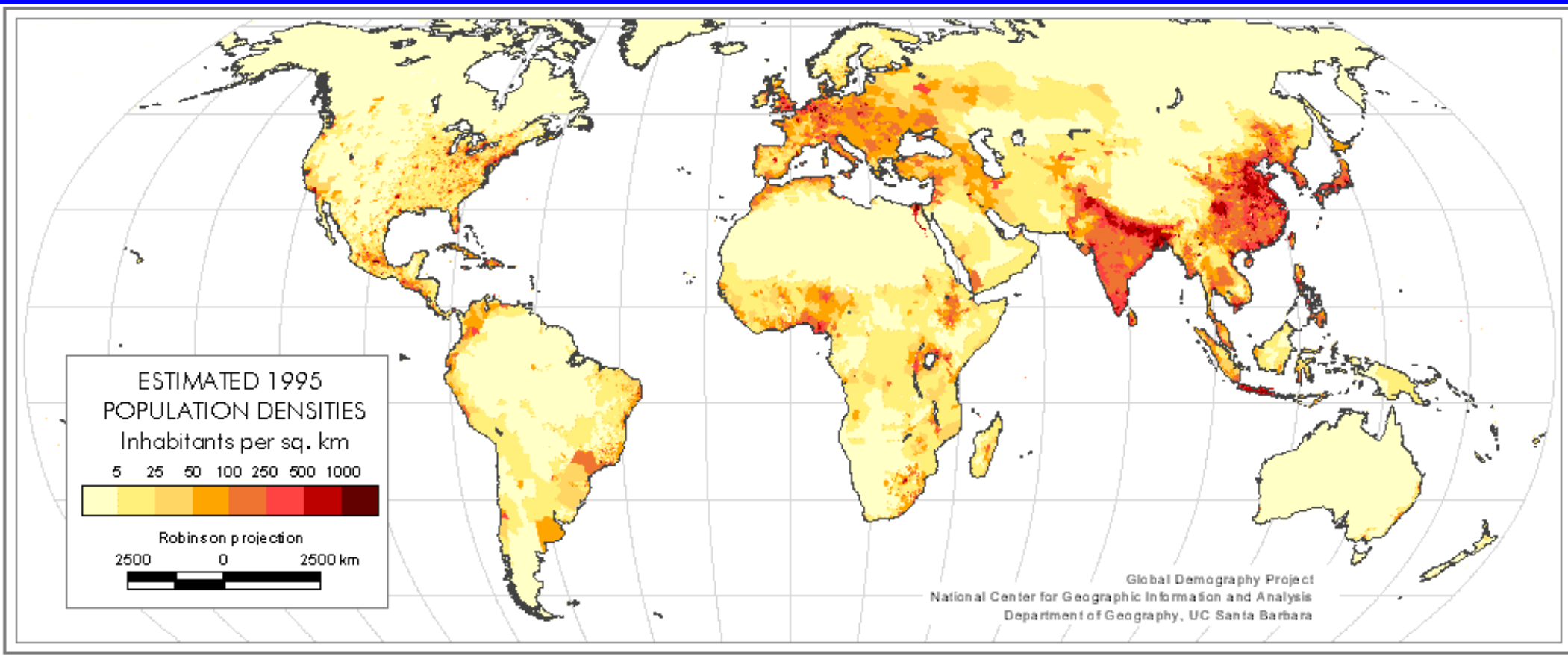


Global Demography Project
National Center for Geographic Information and Analysis
Department of Geography, UC Santa Barbara



Estimated population densities

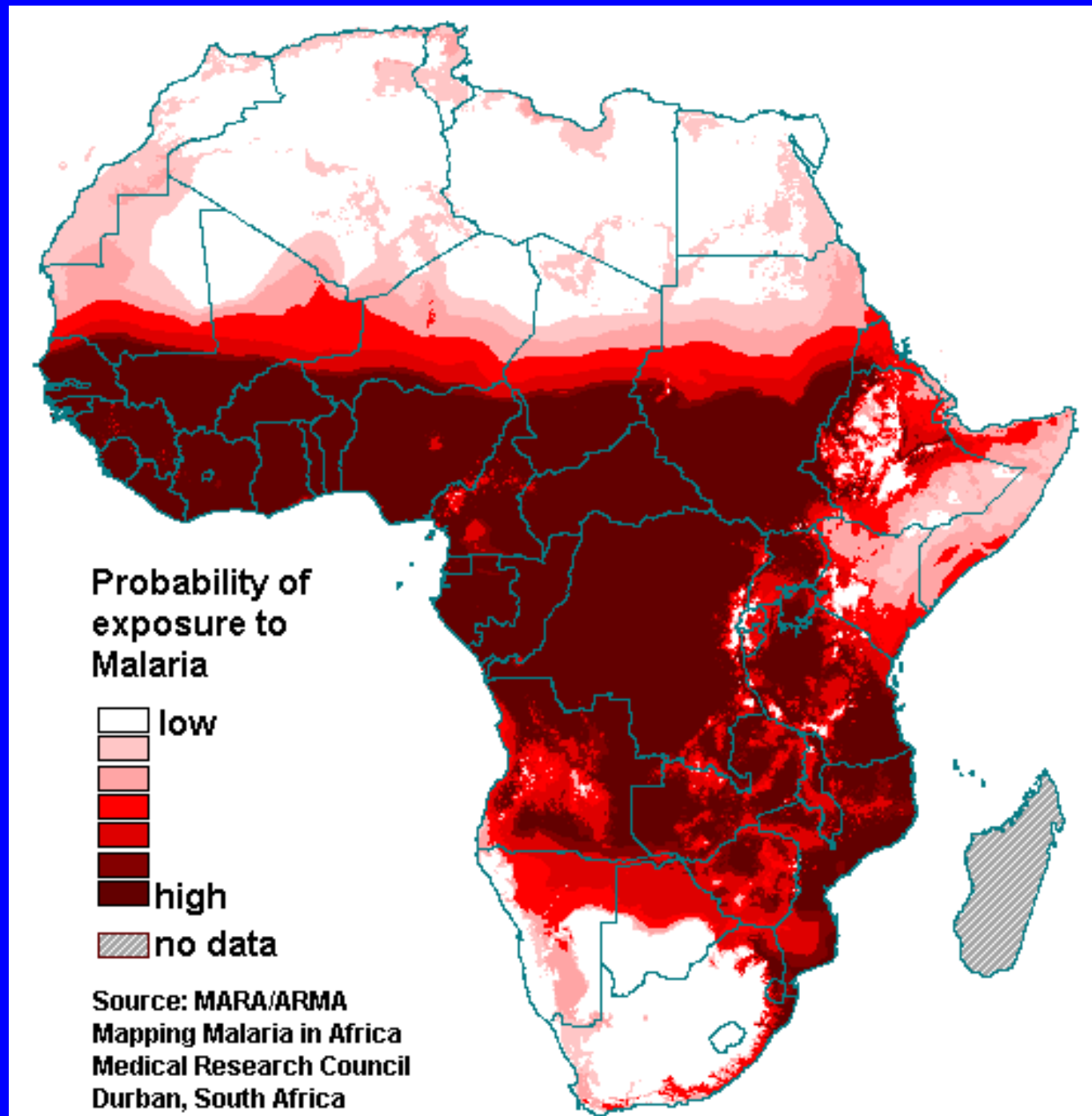
Source: NCGIA, UNEP/GRID



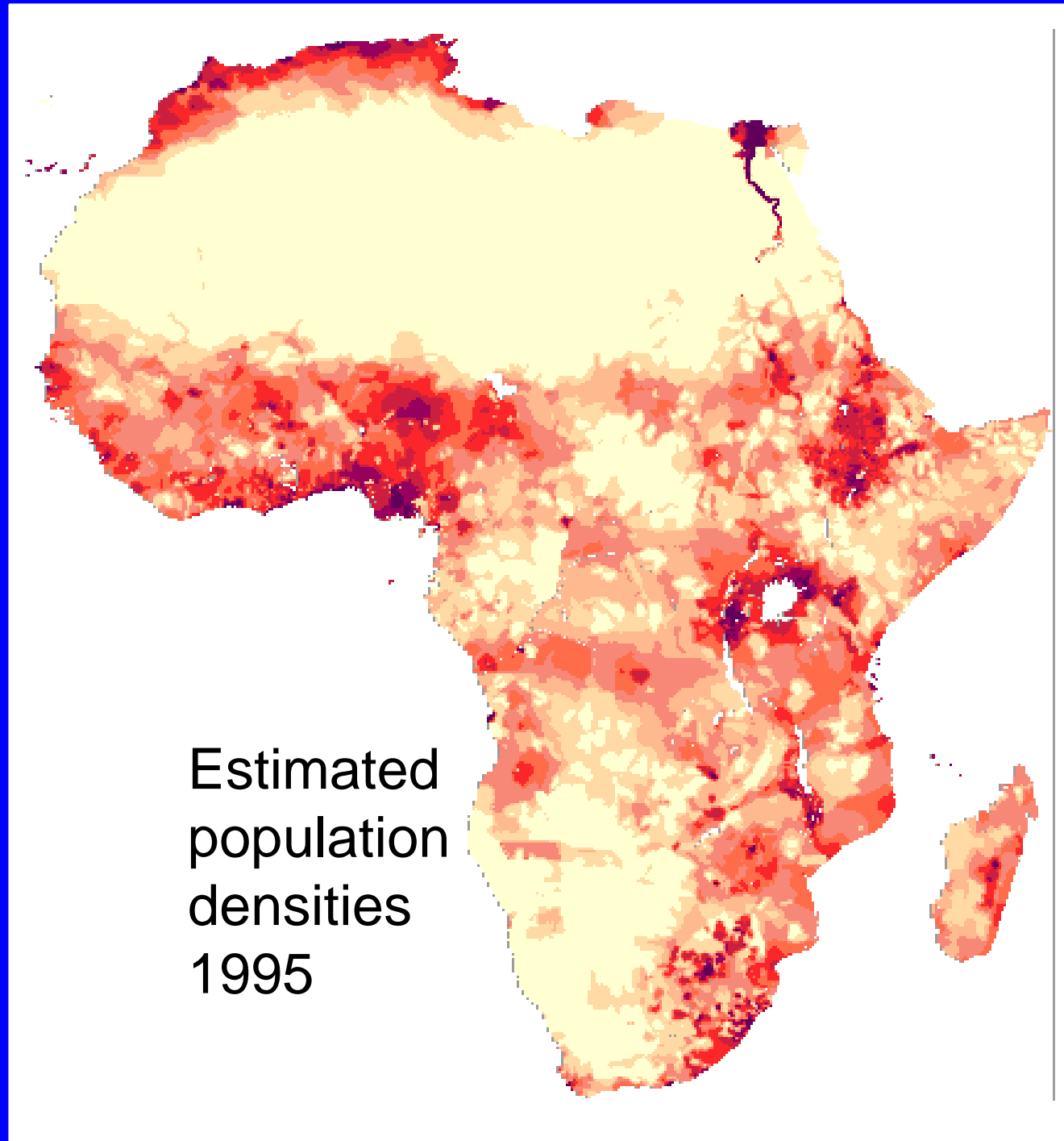
How many people in Africa are at risk of getting malaria?

MARA/ARMA Study
Mapping Malaria in Africa
Medical Research Council
Durban, South Africa

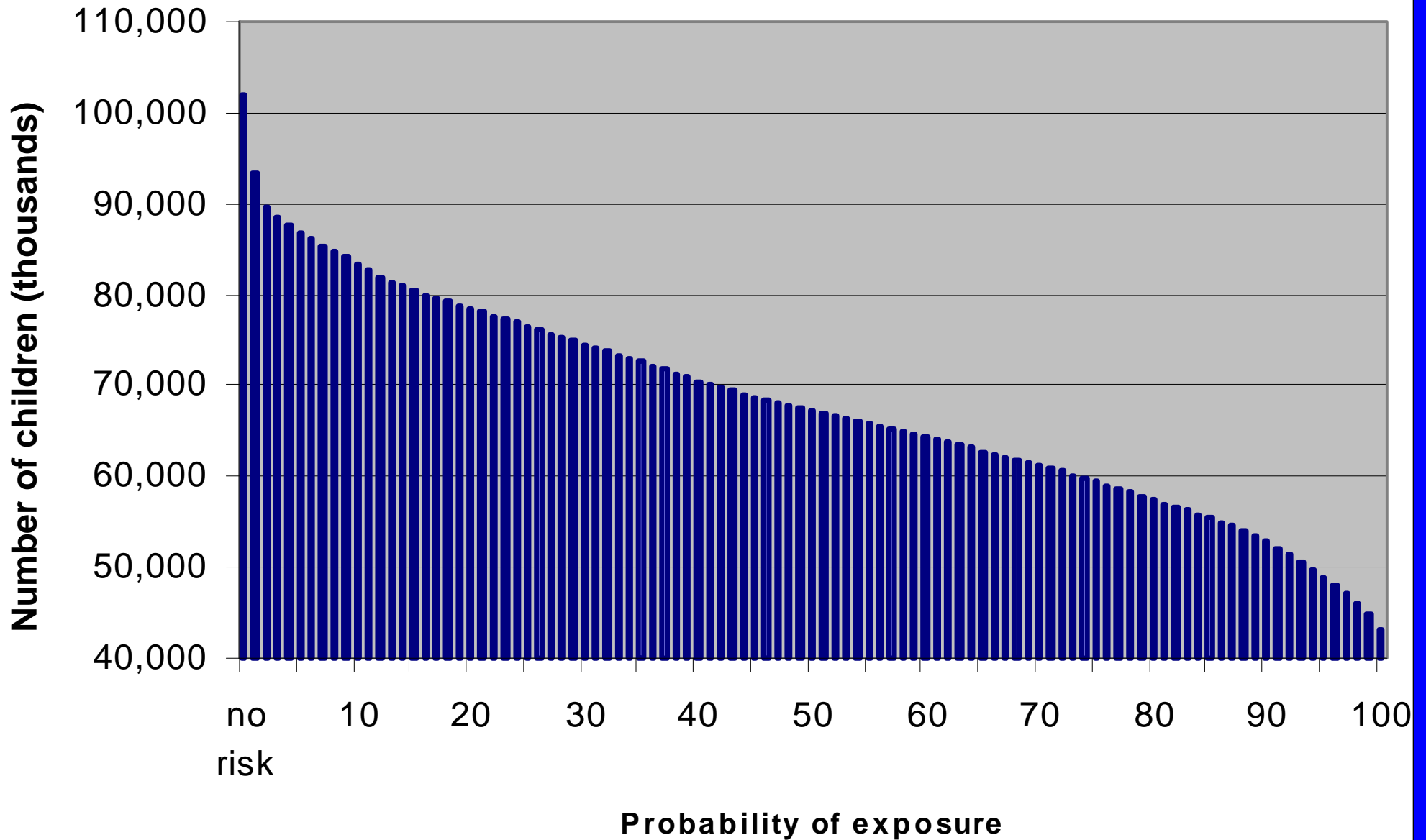
Risk of exposure to malaria was estimated using information on climate and elevation, and known transmission rates in different climatic conditions.



Malaria risk information can be combined with information on the distribution of population in different age groups to find out how many people are affected

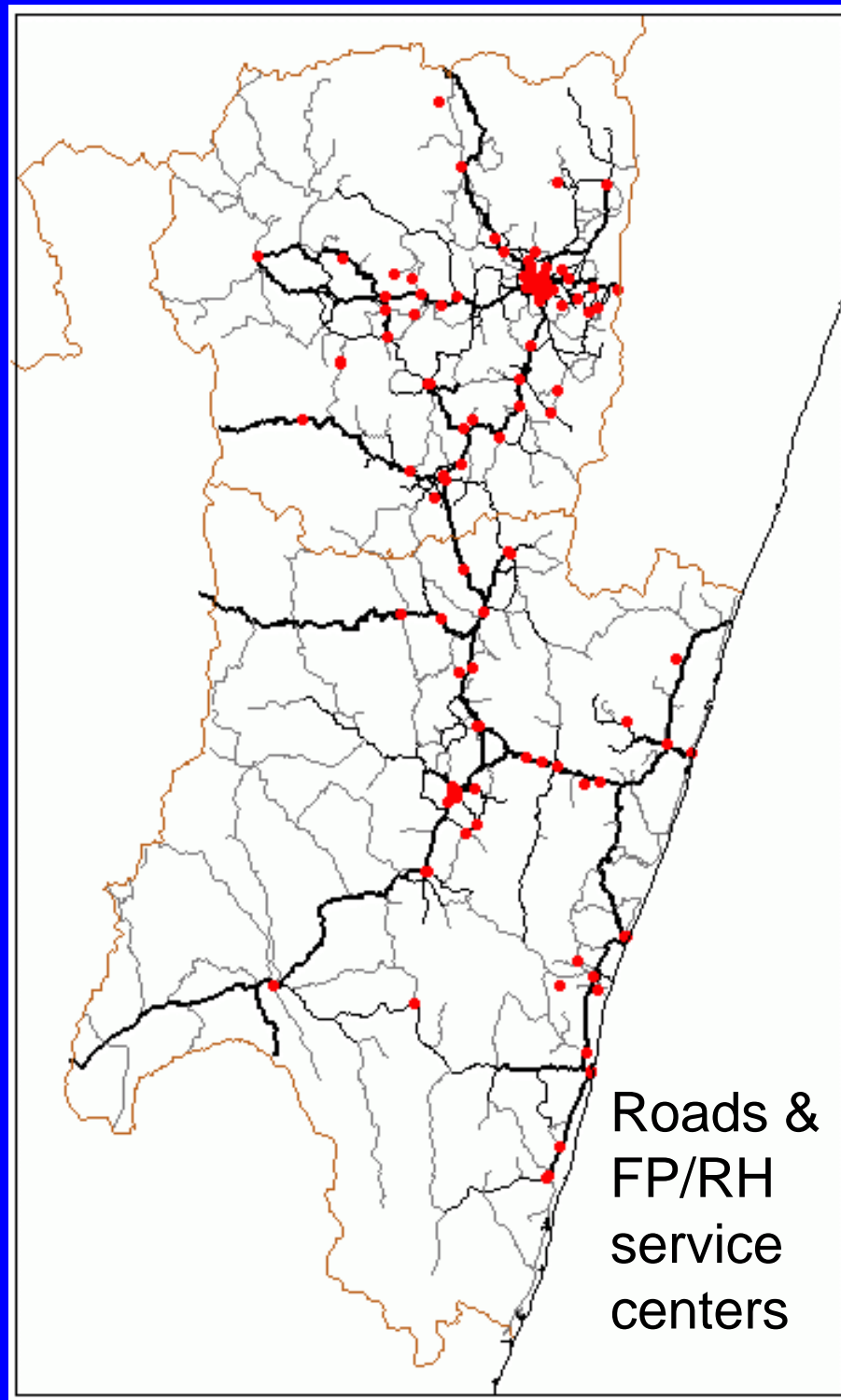


Cumulative number of children under five by probability of exposure

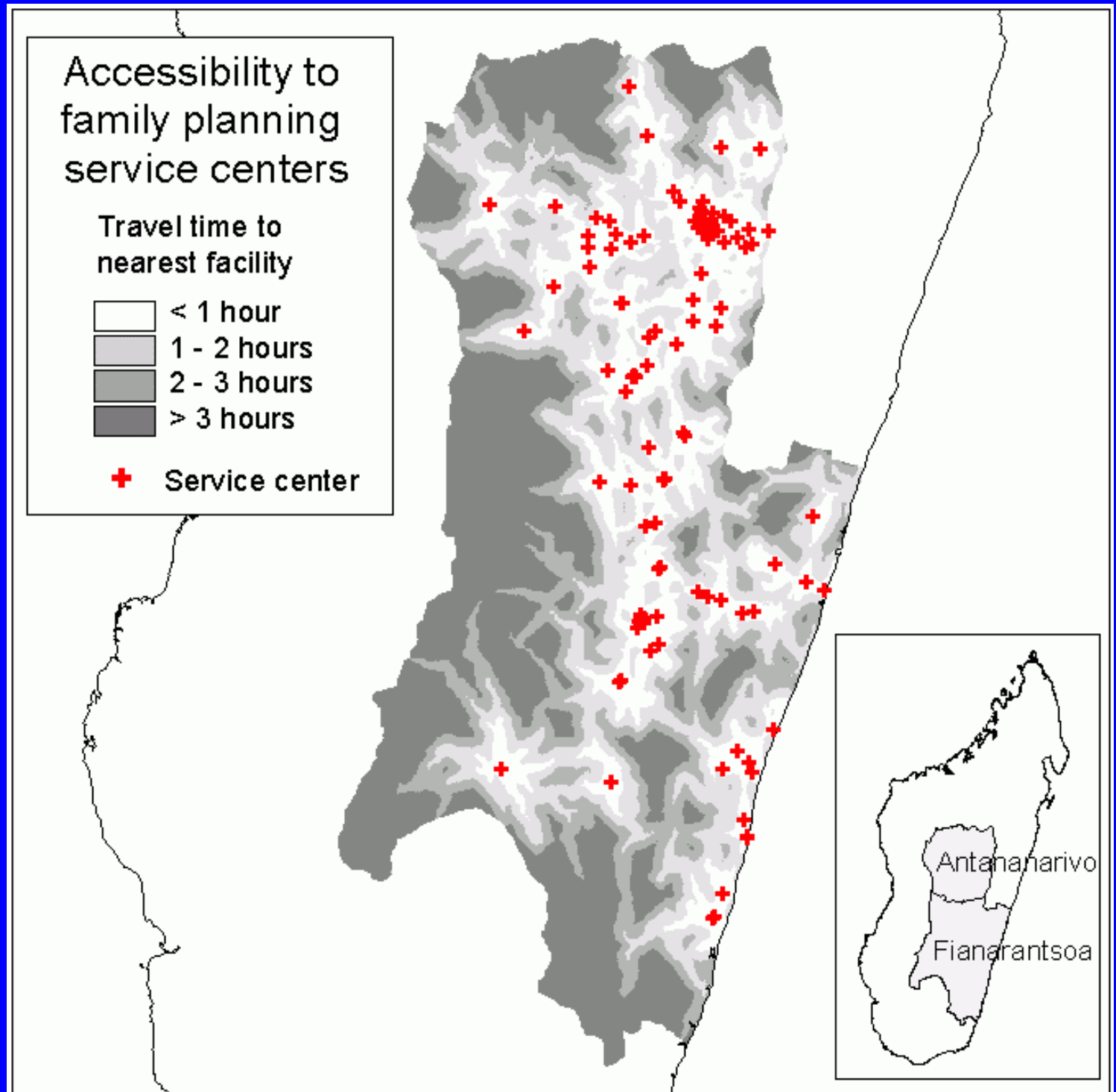


Is accessibility to reproductive health services adequate?

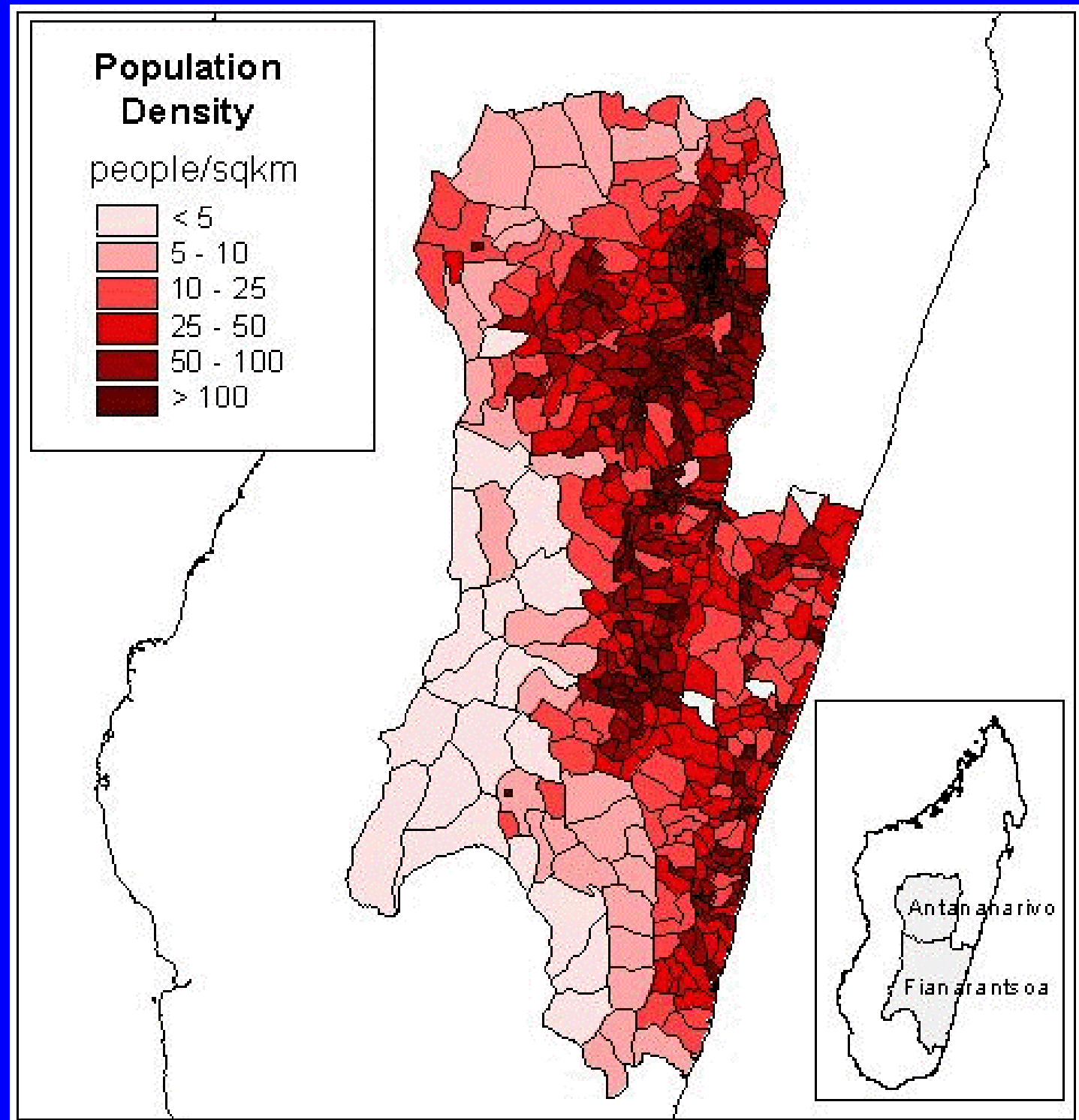
Example:
Two provinces in Madagascar

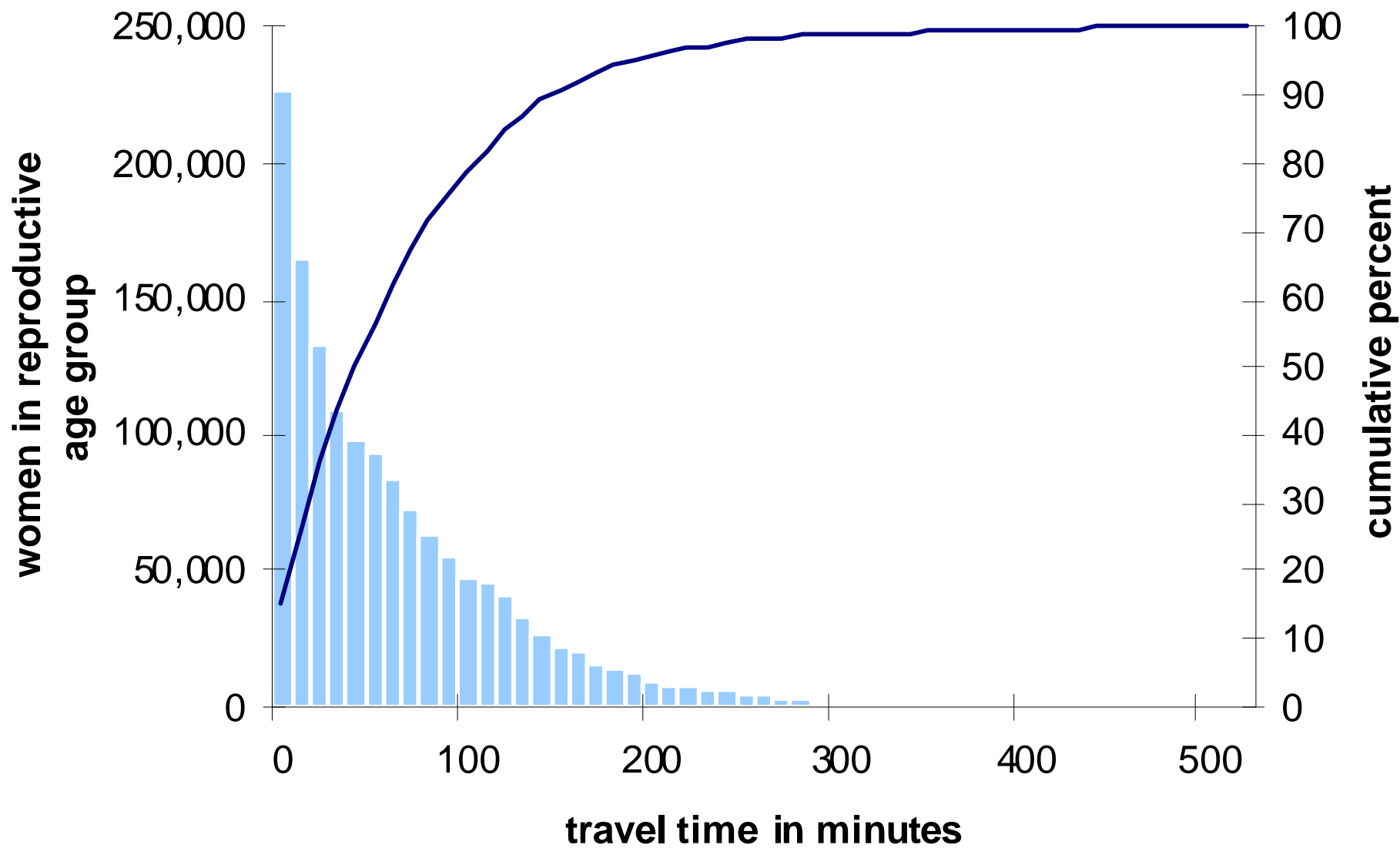


Using network functions in the GIS, we can compute the travel time from every location in the study area to the nearest service center

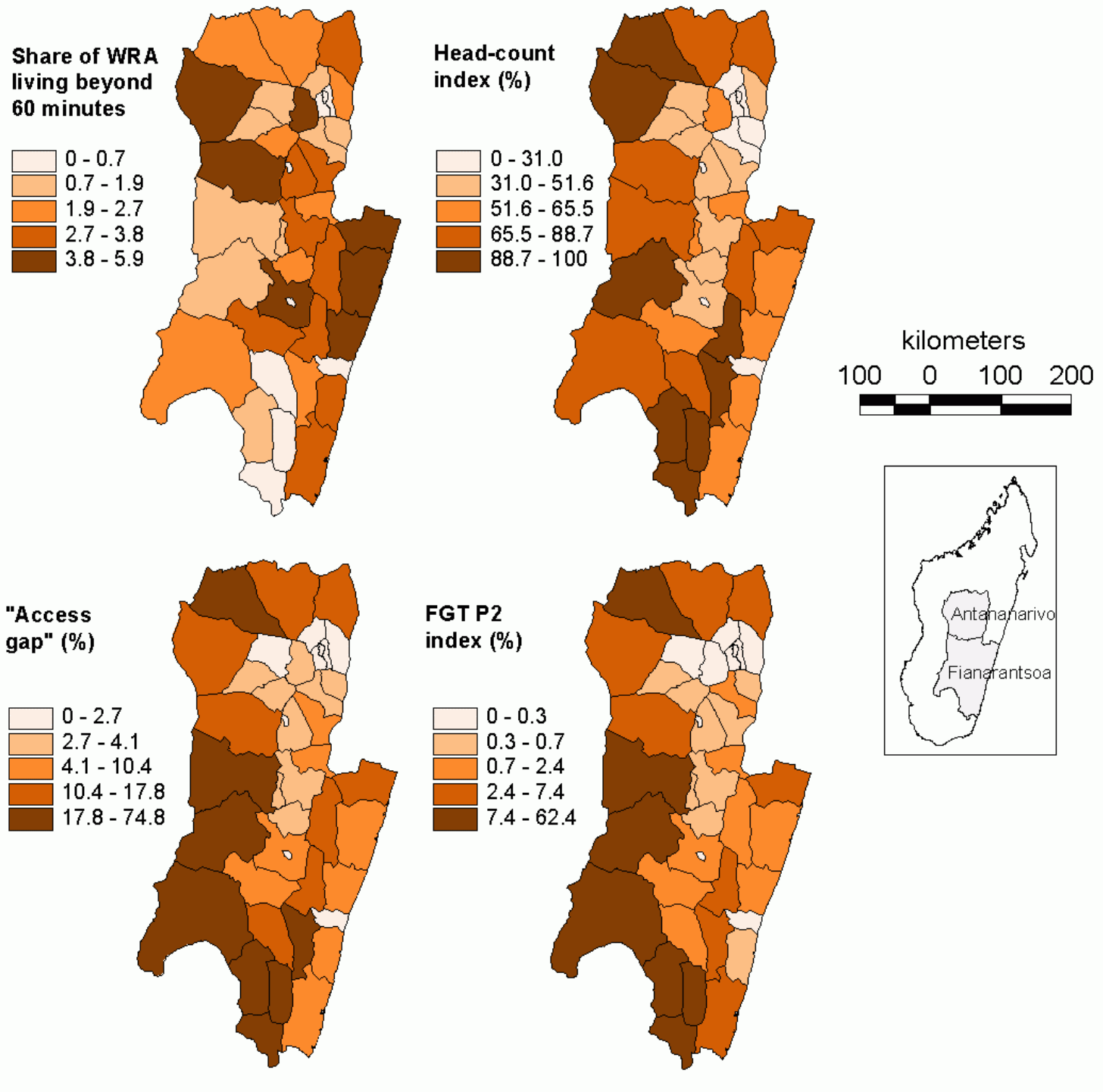


In combination with census data for small areas, we can compute how many people in the region do not have adequate access to service centers





Accessibility indicators can be summarized by district



The dark colors indicate districts where accessibility is inadequate

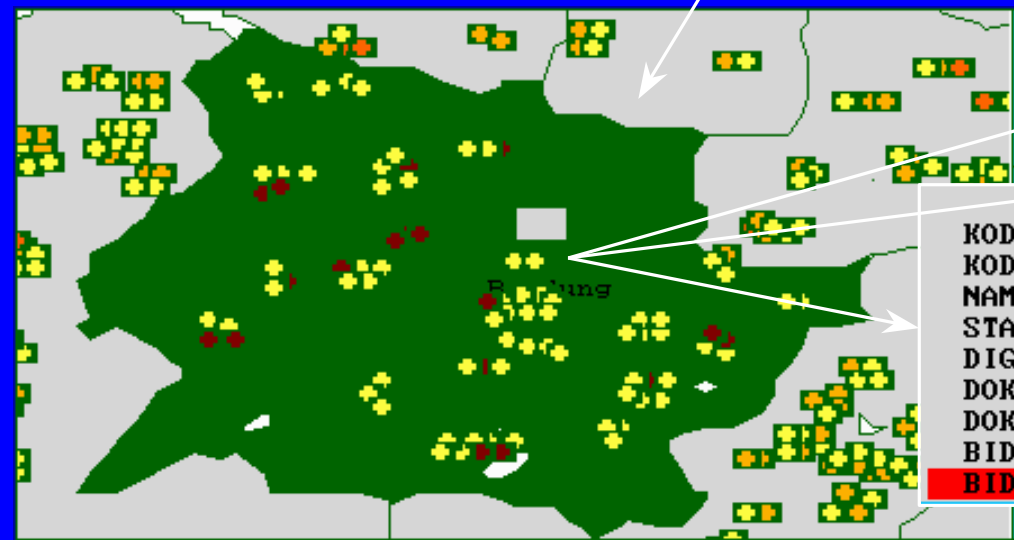
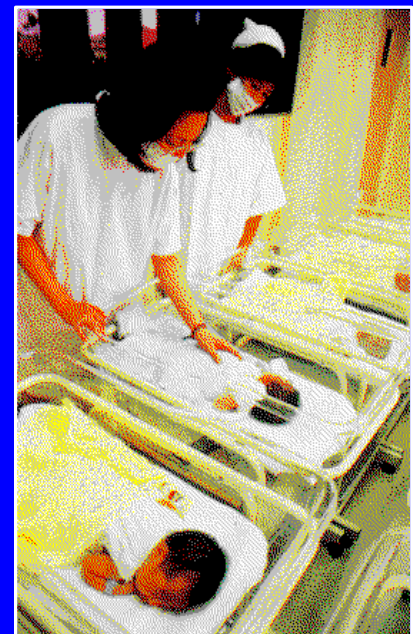
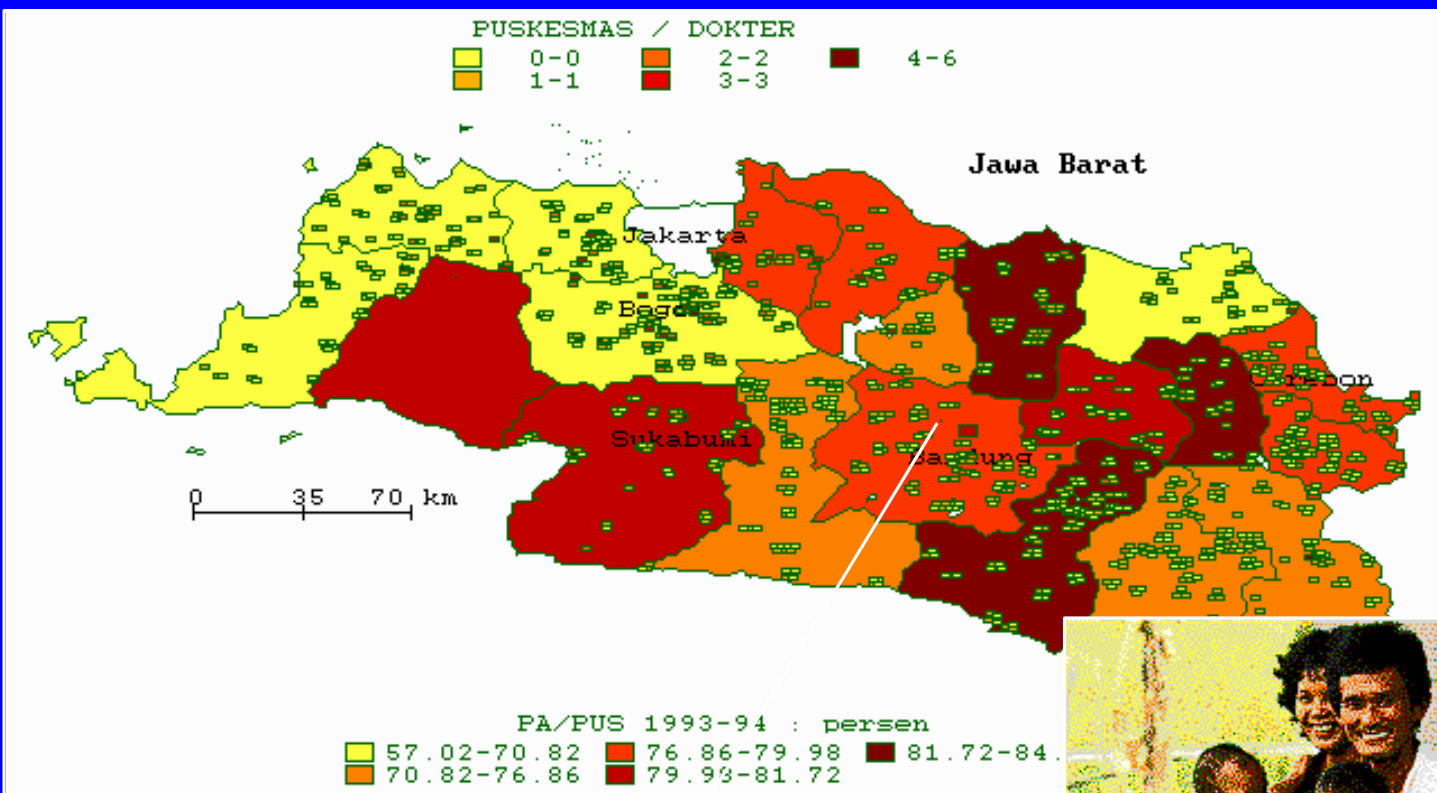
Note: all figures refer to women in reproductive age (WRA)

GIS helps maintain comprehensive databases

Case study:

Family planning in Indonesia

Family Planning Information System for Indonesia in POPMAP



PUSKESMAS: REGOL 2	
KODE KLINIK	1021037
KODE KECAMATAN	102113
NAMA KLINIK	KKB PASUNDAN
STATUS KLINIK	DEPKES
DIGABUNG DANGAN	PKM
DOKTER	6 ORANG
DOKTER LATI KB	1 ORANG
BIDAN	2 ORANG
BIDAN LATI KB	2 ORANG