

# Cost of malaria control in China: Henan's consolidation programme from community and government perspectives

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**Objective** To assist with strategic planning for the eradication of malaria in Henan Province, China, which reached the consolidation phase of malaria control in 1992, when only 318 malaria cases were reported.

**Methods** We conducted a prospective two-year study of the costs for Henan's malaria control programme. We used a cost model that could also be applied to other malaria programmes in mainland China, and analysed the cost of the three components of Henan's malaria programme: suspected malaria case management, vector surveillance, and population blood surveys. Primary cost data were collected from the government, and data on suspected malaria patients were collected in two malaria counties (population 2 093 100). We enlisted the help of 260 village doctors in six townships or former communes (population 247 762), and studied all 12 325 reported cases of suspected malaria in their catchment areas in 1994 and 1995.

**Findings** The average annual government investment in malaria control was estimated to be US\$ 111 516 (case-management 59%; active blood surveys 25%; vector surveillance 12%; and contingencies and special projects 4%). The average cost (direct and indirect) for patients seeking treatment for suspected malaria was US\$ 3.48, equivalent to 10 days' income for rural residents. Each suspected malaria case cost the government an average of US\$ 0.78.

**Conclusion** Further cuts in government funding will increase future costs when epidemic malaria returns; investment in malaria control should therefore continue at least at current levels of US\$ 0.03 per person at risk.

**Keywords** Malaria/prevention and control/economics; Health expenditures; Health care costs; Financing, Government; Costs and cost analysis; Prospective studies; China (*source: MeSH, NLM*).

**Mots clés** Paludisme/prévention et contrôle/économie; Dépenses de santé; Coût soins médicaux; Financement par gouvernement; Coût et analyse coût; Etude prospective; Chine (*source: MeSH, INSERM*).

**Palabras clave** Paludismo/prevenición y control/economía; Gastos en salud; Costos de la atención en salud; Financiamiento gubernamental; Costos y análisis de costo; Estudios prospectivos; China (*fuentes: DeCS, BIREME*).

Bulletin of the World Health Organization 2002;80:653-659.

*Voir page 659 le résumé en français. En la página 659 figura un resumen en español.*

## Introduction

When China introduced market reforms in the 1990s, government finance for public health fell and disease-control programmes depended on regulated user fees (1, 2). Henan Province (Fig. 1), with its population of 90 million, provides a clear illustration of this trend. In 1970, for example, Henan had the highest annual incidence of malaria in China (17%; 10.22 million cases). But in 1992, only 318 cases were reported (0.37 cases per 100 000 population), and by 1993, Henan achieved the consolidation phase ("basic elimination"), only one step away from eradicating the disease. As a result, free insecticide impregnation of bednets and insecticide spraying of houses was stopped (but bednet support was later reinstated after an epidemic of vivax malaria) (3). These actions were taken, even though the economic costs of malaria control were unknown.

The problems in Henan are typical of many of the 19 malaria-endemic areas in China, especially those above latitude 25°N (4). Malaria incidence remains relatively high in four southern counties of Henan, with rates per 1000 popula-

tion ranging from 3.91 to 41.3 (5). The 29 039 malaria cases reported by China in 1999 (resulting in 67 deaths) were estimated to represent about 10% of the actual totals (6). Henan contributes about 10% of the national burden and remains at risk of major malaria epidemics (3).

To estimate the costs of controlling malaria in Henan, where disease control is at the consolidation stage, we examined input costs for each of Henan's three malaria control outputs: vector surveillance; population blood surveys; and case-management (7). We compared costs borne by the community and the government, and concluded that further cuts in malaria control will increase the risk of epidemics. This is important, since *The world health report 2000* (8) ranks China a low 139th for health expenditure per capita, and even though population health is good (ranked 61st), it will deteriorate unless the health system improves.

Our report provides policy makers with timely information for planning malaria control and shows how such information can be collected. Other studies have examined control costs in areas, such as Sri Lanka and Thailand, where

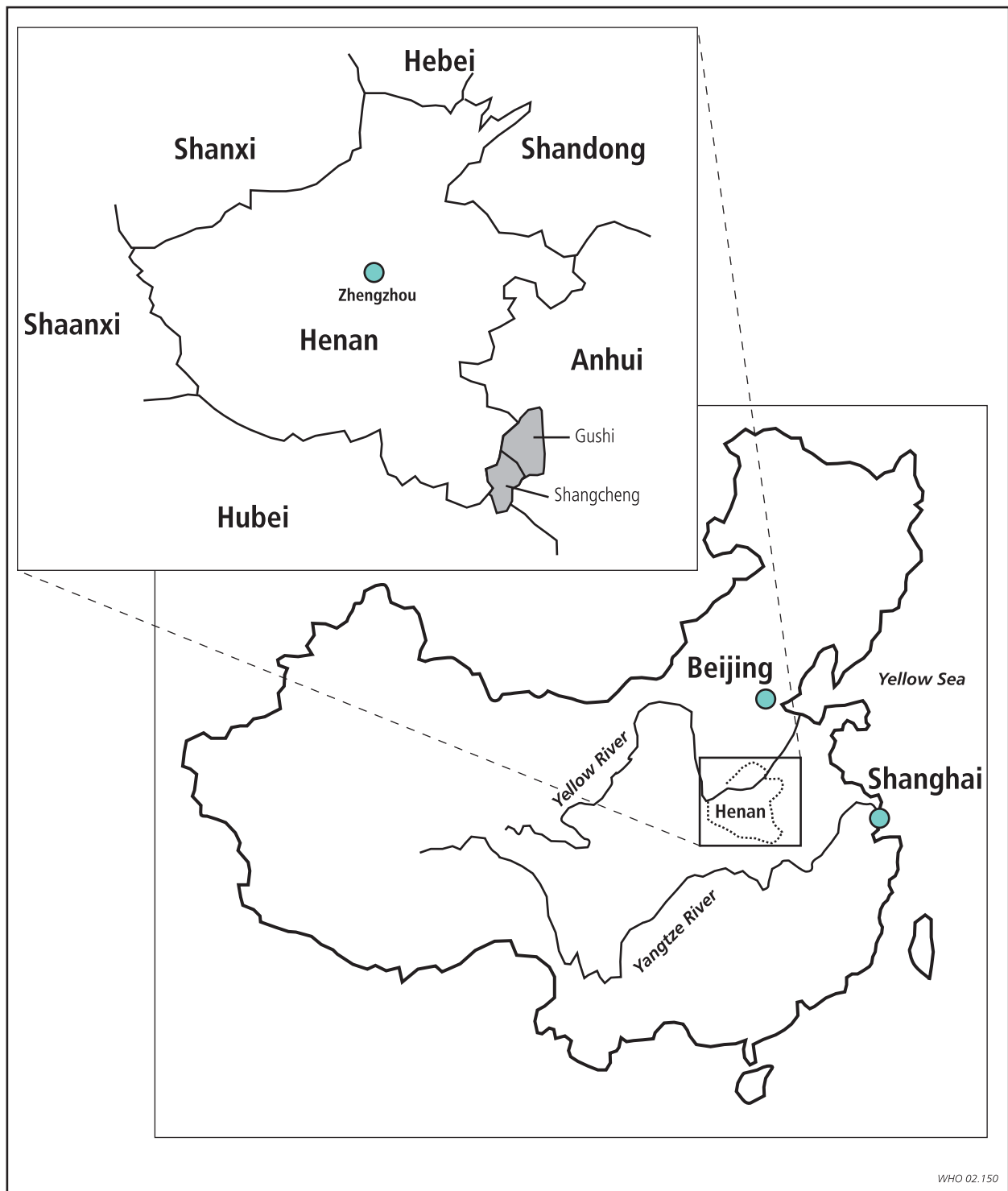
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Ref. No. 01-1154

Fig. 1. Malaria study counties (shaded areas) in Henan Province



malaria is endemic (9, 10), but these have limited relevance to the situation in China. In contrast, our cost analysis takes account of the bureaucratic structure set up in China in the 1950s and allows malaria programmes throughout China to be compared. As such, it provides a model for mainland China.

### Methods

In 1994 and 1995 we prospectively collected data from primary sources for the government and the community, and calculated

the total cost for the three products of Henan Province's malaria programme: vector surveillance, population blood surveys, and case-management of suspected malaria cases. The first two comprised government outlays only, whereas case-management included costs for both the government and the community. All costs were estimated and compared within the two counties of Gushi and Shangcheng. Community costs were estimated from a sample of 12 325 reported cases of suspected malaria.

For government costs, we studied four levels: i) provincial: the capital, Zhengzhou; ii) prefectural: Xin Yang; iii) county: Gushi and Shangcheng (the worst malaria areas in the Xin Yang prefecture); and iv) township (former commune): all 55 townships in Gushi and Shangcheng. Most government inputs went to four malaria-endemic counties in Xin Yang prefecture, with 61.5% of provincial and prefectural costs going to Gushi and Shangcheng, reflecting their share of the total population in the malaria-endemic areas. Costs arising within the two counties were measured directly. Administrative input costs for all three malaria control components were obtained from the Henan government budget allocations, and found to be 10% for vector surveillance, 30% for blood surveys, and 60% for case-management.

For community costs, we measured all reported cases of suspected malaria in six townships (population 247 762), representing Gushi and Shangcheng counties (population 2 093 100). In these areas, doctors used a standard criterion to diagnose fever (axillary temperature  $\geq 37.5^{\circ}\text{C}$ ) (5). Fever cases with typical features of malaria (chills, intermittent rigors, and sweating) that occurred during the transmission season (July–October), and that had no other obvious cause, were diagnosed as suspected malaria and treated as if they had malaria. In the six townships, 260 doctors managed a total of 12 325 suspected malaria cases. The cases fulfilled all the diagnostic criteria for malaria and were accepted on review by one of us (Xi-Li Liu) as cases of clinical malaria.

### Classifying costs

Economists classify costs according to their traceability (direct and indirect) to the object or activity (9), or by their relationship to output (fixed and variable). Direct and indirect costs are used by health economists to classify (demand-side) patient costs associated with illness (11). Fixed and variable costs are used by microeconomists to model short-run production (12, 13) and are appropriate categories for analysing supply (production) of health interventions, such as malaria control.

In our study, demand-side direct costs for all suspected malaria patients included consultation fees and payment for drugs, as well as the “non-health direct costs” for patients’ transportation and food. The indirect costs included lost productivity or lost incomes of patients and carers, and costs incurred by carers, such as transportation and food. On the supply side for malaria control, fixed costs are those that continue even when production stops (e.g. staff wages, staff housing, non-wage benefits and buildings). Variable costs, inputs that change with output, include government outlays for materials and drugs, electricity, casual labour, and travel (14).

### Identifying costs

Although we identified all costs known to us, measuring some of the costs was not straightforward, as explained below. All government costs are separated into fixed and variable costs.

#### Fixed Costs

There were two fixed-cost items, the first being wages, other benefits, and staff housing of administrative officials and professionals. At every level, the professionals worked full-time in malaria control. However, administrative officials also worked in other health programmes. Their costs were therefore calculated according to the amount of time they

spent on malaria work, and converted to the equivalent of full-time positions.

In 1994–95, calculating subsidized housing costs without a real-estate market was a problem and we estimated this by the simplest method. Since staff housing was built by the government, we used available information on the average cost of construction (1400 yuan per  $\text{m}^2$ ) and the average housing per family in Henan Province (37.95  $\text{m}^2$ ) (15), to calculate the replacement cost for one housing unit as (1400 x 37.95) = 53 130 yuan (US\$ 6641; US\$ 1 = 8 yuan). We calculated the annual cost of one housing unit, by assuming government housing would last 30 years, and a discount rate of 3% for both depreciation and opportunity costs (as used in most health work). Thus, we divided 53 130 yuan by an annuity factor of 19.6004 (3% interest rate for 30 years) to yield an annual cost of 2711 yuan (14). We assumed that each staff member or equivalent full-time member occupied one housing unit.

We summed the wages, other benefits, and housing costs for malaria workers in Gushi and Shangcheng at the county and township levels. For those working at prefectural and provincial levels, we assumed 61.5% of their work was devoted to Gushi and Shangcheng, and added their costs accordingly to generate the final total for these two counties.

The second fixed-cost item was government buildings. Because of the lack of reliable historical data and the non-market nature of government buildings in China, we calculated these costs using the building replacement method often applied in health finance analyses (11). Total building space allocated to malaria control was 2224  $\text{m}^2$ . This included space at the province and Xin Yang prefecture levels, and at the four malaria counties in Xin Yang, including the 96 townships and three vector surveillance stations. With an average cost of construction set at 1400 yuan per  $\text{m}^2$  (same as above for housing), the replacement cost is 3 113 600 yuan (US\$ 389 200). The annual cost of the buildings can be estimated by the same procedure used above for housing (3 113 600 yuan divided by an annuity factor of 19.6004 yields 158 854 yuan, or US\$ 19 857). The building costs for malaria control within Gushi and Shangcheng counties reflect their share of the total endemic-area population (61.5%) and thus amount to 97 695 yuan (158 854 yuan x 0.615).

#### Variable Costs

**Administration running costs.** Seven cost items were associated with the administration of malaria control: upgrading skills; travel; conferences and meetings; utilities (water, electricity and telephone); hospitality; office supplies and printing; and building maintenance and repairs.

**Field labour and staff training.** Cost items included activities of the county-level Anti-Epidemic Stations and township hospitals, and prefecture-level training of microscopists for blood tests of suspected malaria patients. Labour costs of malaria microscopists were estimated as a proportion of their full-time work in the hospitals.

**Antimalarial drugs.** The cost item for antimalarial drugs came from purchases and distribution. Each year, the Henan Institute of Parasitic Diseases bought the drugs and dispatched them to Xin Yang prefecture for distribution to lower levels, down to the village doctors.

**Passive blood-testing supplies.** This cost item included slides, stains, depreciation of microscopes, and sundries for

passive blood tests of suspected malaria cases treated by village or township hospital doctors.

**Contingencies and special projects.** The Provincial Health Bureau has annual funds for special or unforeseen costs associated with malaria work and research. During 1994 and 1995, a total of 38 000 yuan was allotted to Gushi and Shangcheng (Table 1).

### Data collection

#### Patient and community costs

During the July–October malaria transmission seasons of 1994 and 1995, we enlisted village and township hospital doctors to detect all suspected malaria cases seeking treatment. We trained the doctors to use pro formas to collect information on the costs (direct and indirect) of patients seeking treatment, but did not train them to change their case-management behaviour. A total of 12 325 suspected malaria cases were recorded by 260 village and hospital doctors in the six study townships (Chengjiao, Huzu, and Nan Daqiao in Gushi county; and Shang Shiqiao, He Fengqiao, and Fengji in Shangcheng county). The 247 762 residents of the six townships constituted 11.84% of the total population of 2 093 100 residing in Gushi and Shangcheng counties and we assumed the 12 325 study cases were representative of all suspected malaria cases in Gushi and Shangcheng counties.

#### Costs for the Henan government

We prospectively recorded government costs for 1994 and 1995. The data were collected every two months in the six study townships, and every six months for the other 49 townships located in Gushi and Shangcheng. Similar data were also obtained for the three higher levels: Gushi and Shangcheng Anti-Epidemic Stations; Xin Yang prefecture Anti-Epidemic Station and Health Bureau; and Henan Provincial Health Bureau and Henan Provincial Institute of Parasitic Diseases.

#### Data analyses

For patients, we calculated the average costs. For the government, we calculated the total cost and cost breakdowns for the three products of the Henan Province malaria control programme. The proportions of variable costs relative to total costs indicate the potential for short-term savings if malaria is eradicated. The fixed cost proportion for each of the three malaria control components indicates whether discontinuance of a single component is likely to save money. Finally, we averaged the annual government cost of malaria control for the whole province (Table 1 footnote), as well as both community (patients and their carers) cost and government cost per reported case of suspected malaria (Table 2 and Table 3).

## Results

### Patient costs

We identified 12 cost items incurred by 12 325 people with suspected malaria who sought treatment in our sample of six townships. The total cost for all suspected malaria cases in 1994 and 1995 was 343 248 yuan (Table 2). The average patient cost per suspected malaria case was 27.85 yuan (US\$ 3.48), equivalent to 10-times the average per capita daily income for Gushi and Shangcheng (2.74 yuan).

Table 1. Total government costs for malaria control in Gushi and Shangcheng, 1994 and 1995<sup>a</sup>

Cost item	1994	1995	Cost totals for both years	Average annual costs for both years
Wages and benefits (fixed)	134 102	127 031	261 133	130 567
Staff housing (fixed)	73 387	64 115	137 502	68 751
Government buildings (fixed)	97 695	97 695	195 390	97 695
Administration running	164 121	108 450	272 571	136 286
Field labour and training	27 173	30 005	57 178	28 589
Antimalarial drugs	58 069	31 716	89 785	44 893
Passive blood tests supplies <sup>b</sup>	4 367	3 266	7 633	3 817
Contingencies and special projects	20 000	18 000	38 000	19 000
Equipment depreciation (fixed)	95	28	123	62
Vector surveillance supplies	5 000	18 000	23 000	11 500
Special <i>Anopheles anthropophagus</i> surveys	4 000	9 000	13 000	6 500
Active blood tests supplies <sup>c</sup>	0	2 000	2 000	1 000
<b>Total costs</b>	<b>588 009</b>	<b>509 306</b>	<b>1 097 315</b>	<b>548 660</b>

<sup>a</sup> All costs are shown rounded to the nearest yuan. Assuming that Gushi and Shangcheng counties required 61.5% of the total investment in malaria control (see Methods), the total annual government cost for Henan Province is 892 130 yuan (US\$ 111 516) (548 660 yuan/0.615).

<sup>b</sup> For use by microscopists in township hospitals to examine blood slides of suspected malaria patients.

<sup>c</sup> For use in population blood surveys conducted regularly among at-risk populations.

### Direct costs

Of the 12 325 patients, 96% with suspected malaria paid an average of 1.11 yuan each for antimalarial drugs (Table 2), and 95% bought other drugs and injections, paying an average of 9.27 yuan. Although village doctors were not supposed to charge consultation fees, 63% of the 12 325 patients paid an average of 1.18 yuan. Village doctors took blood tests from only 16% of suspected malaria patients, charging an average of 1.69 yuan. As doctors no longer received a government allowance for blood tests, they charged patients for dispatching blood slides to microscopists in township hospitals, although the tests were nominally free of charge. Of the 12 325 cases, only 8% used self-medication before visiting the doctor; the average cost of self-medication was 4 yuan, equivalent to 1.5 days' income. Overall, 10% of patients had to buy food (at an average cost of 8.80 yuan) and only 9% incurred transport costs (at an average cost of nearly 2 yuan), demonstrating that a relatively small number of patients had to travel to seek treatment from village doctors and thus needed to buy food during their visits.

### Indirect costs

A major indirect cost was the patient's income loss, which averaged 20 yuan and affected 52% of the 12 325 cases (Table 2). Thirty-two percent of all cases were accompanied by carers whose income loss averaged 10.80 yuan. Carers' food costs averaged 6.65 yuan and affected 11% of the cases, while transport costs averaged 2.62 yuan and affected 10% of the cases.

Table 2. Costs incurred by suspected malaria patients and their carers in Gushi and Shangcheng counties, 1994 and 1995

Cost item	No. of patients incurring cost item (A)	Cost for all patients incurring cost item <sup>a</sup> (B)	Average cost for patients incurring cost item (B/A)	% of patients incurring cost item <sup>b</sup>	Average cost per patient <sup>c</sup>
Consultation fees	7 807	9 172	1.18	63	0.74
Drugs/injections	11 744	108 838	9.27	95	8.83
Blood examination	1 924	3 244	1.69	16	0.26
Antimalarial drugs	11 787	13 085	1.11	96	1.06
Transportation	1 076	2 128	1.98	9	0.17
Food during treatment	1 173	10 295	8.78	10	0.84
Self-treatment before visiting doctor	984	3 943	4.01	8	0.32
Patient's income loss	6 456	129 470	20.05	52	10.50
Transportation of carer	1 245	3 260	2.62	10	0.27
Food for carer	1 390	9 245	6.65	11	0.75
Income loss of carer	3 997	43 217	10.81	32	3.51
Other costs of carer	1 205	7 343	6.09	10	0.60
<b>Total costs</b>		<b>343 248</b>			<b>27.85</b>

<sup>a</sup> All costs in column B are shown rounded to the nearest yuan.

<sup>b</sup> Calculated by dividing the corresponding number of cases for each cost item (column A) by the total number of suspected malaria cases (12 325).

<sup>c</sup> Calculated by dividing the corresponding cost totals for each cost item (column B) by the total number of suspected malaria cases (12 325).

Table 3. Government costs for malaria case-management in Gushi and Shangcheng, 1994 and 1995<sup>a</sup>

Cost item	1994	1995	Cost totals for both years	Average annual costs for both years
Wages and benefits (fixed) <sup>b</sup>	80 461	76 219	156 680	78 340
Staff housing (fixed) <sup>b</sup>	44 032	38 469	82 501	41 251
Government buildings (fixed) <sup>b</sup>	58 617	58 617	117 234	58 617
Administration running <sup>b</sup>	98 473	65 070	163 543	81 772
Field labour and training <sup>b</sup>	16 304	18 003	34 307	17 154
Antimalarial drugs	58 069	31 716	89 785	44 893
Passive blood tests supplies <sup>c</sup>	4 367	3 266	7 633	3 817
<b>Total costs for 55 townships</b>	<b>360 323</b>	<b>291 360</b>	<b>651 683</b>	<b>325 844</b>

<sup>a</sup> All costs are shown rounded to the nearest yuan. Total government cost for case-management in Gushi and Shangcheng in 1994 and 1995 was 651 683 yuan. Since the suspected malaria cases we studied in six townships represented 11.84% of the total number of suspected cases for Gushi and Shangcheng, the corresponding case-management cost for the townships was 77 159 yuan (0.1184 x 651 683 yuan), and the government cost per suspected malaria case was 6.26 yuan (US\$ 0.78) per case (77 159 yuan/12 325 cases).

<sup>b</sup> These cost items represented 60% of the equivalent total government cost items for malaria control, shown in Table 1.

<sup>c</sup> See footnote b, Table 1.

## Government costs

### Malaria case-management

Case-management was the most expensive of the three malaria control products. For 1994 and 1995, the average annual cost was 325 844 yuan (US\$ 40 731) in Gushi and Shangcheng (Table 3). Adjusting for the total of 3.4 million people at risk in Henan Province and extrapolating from observations of the two study counties (see Methods), we calculated the average cost to the government per suspected malaria case to be 6.26 yuan (US\$ 0.78) (Table 3).

For antimalarials in the whole province, the government paid 150 000 yuan in 1994 and 40 000 yuan in 1995. Chinese policy does not require every patient to undergo blood tests where the malaria incidence is below 1 per 1000. Consequently, only 1935 (out of 12 325) suspected malaria cases had blood tests, and microscopists reported on 1928 of the cases, with 24 positive and 1904 negative for malaria.

### Population blood surveys

Henan Province was in the consolidation phase and carried out blood surveys at the end of each transmission season (in October), using rotating samples. It was labour intensive to sample households and 49% of the costs were spent on fixed and variable labour inputs (wages and benefits; staff housing; and field labour and training) (Table 4). The total annual cost of blood surveys in Gushi and Shangcheng averaged 139 568 yuan (US\$ 17 446) during 1994 and 1995 (Table 4).

Table 4. Government costs for population blood surveys in Gushi and Shangcheng, 1994 and 1995<sup>a</sup>

Cost Item	1994	1995	Cost totals for both years	Average annual costs for both years
Wages and benefits (fixed) <sup>b</sup>	40 231	38 109	78 340	39 170
Staff housing (fixed) <sup>b</sup>	22 016	19 235	41 251	20 626
Government buildings (fixed) <sup>b</sup>	29 309	29 309	58 617	29 309
Administration running <sup>b</sup>	49 236	32 535	81 771	40 886
Field labour and training <sup>b</sup>	8 152	9 002	17 154	8 577
Supplies (slides, stain, etc.)	0	2 000	2 000	1 000
<b>Total costs</b>	<b>148 944</b>	<b>130 190</b>	<b>279 133</b>	<b>139 568</b>

<sup>a</sup> All costs are shown rounded to the nearest yuan.

<sup>b</sup> These cost items represented 30% of the equivalent total government cost items for malaria control, shown in Table 1.

### Vector surveillance

The total annual cost of vector surveillance for Gushi and Shangcheng in 1994 and 1995 averaged 64 253 yuan (US\$ 8032) (Table 5). In 1995, a special survey for *Anopheles anthropophagus* was conducted in Gushi and Shangcheng counties following a malaria outbreak, and similar surveys were carried out in three other counties. *An. anthropophagus* was found at seven sites, five of which were in Gushi and Shangcheng. The reappearance of *An. anthropophagus* coincided with an increase in the reported incidence of malaria in some areas of Gushi and Shangcheng, but in others areas there was no association (3).

### Total government costs for malaria control

For Gushi and Shangcheng counties, the total annual government costs of malaria control in 1994 and 1995 averaged 548 660 yuan (US\$ 68 583) (Table 1). Since Gushi and Shangcheng cover 61.5% of the malaria-endemic population (see Methods), we estimated the total annual government cost for malaria control in Henan Province to be 892 130 yuan (US\$ 111 516). We measured costs concurrent with activities and found 59% of government spending actually went to case-management, 25% to blood surveys, 12% to vector surveillance, and 4% to contingencies and special projects.

## Discussion

At the consolidation stage of disease control, the cost per case detected becomes increasingly expensive. For the patients in Henan Province, the cost per suspected malaria case averaged 27.85 yuan (equal to 10 days' income), compared to the government cost per suspected case of 6.26 yuan. Because these people were ill during the busiest period of the agricultural cycle (summer), it is possible that their income loss was even greater. However, we do not know the effects of the illness on labour reserves within the household (16).

Case-management was a major government cost, comprising 59% of total government expenditure, and variable

Table 5. Government costs for vector surveillance in Gushi and Shangcheng, 1994 and 1995<sup>a</sup>

Cost Item	1994	1995	Cost totals for both years	Average annual costs for both years
Wages and benefits (fixed) <sup>b</sup>	13 410	12 703	26 113	13 057
Staff housing (fixed) <sup>b</sup>	7 339	6 412	13 751	6 876
Government buildings (fixed) <sup>b</sup>	9 770	9 770	19 540	9 770
Administration running <sup>b</sup>	16 412	10 845	27 257	13 629
Field labour and training <sup>b</sup>	2 717	3 001	5 718	2 859
Equipment depreciation (fixed)	95	28	123	62
Vector surveillance supplies	5 000	18 000	23 000	11 500
Special <i>Anopheles anthropophagus</i> surveys	4 000	9 000	13 000	6 500
<b>Total costs</b>	<b>58 743</b>	<b>69 759</b>	<b>128 502</b>	<b>64 253</b>

<sup>a</sup> All costs are shown rounded to the nearest yuan.

<sup>b</sup> These cost items represented 10% of the equivalent total government cost items for malaria control, shown in Table 1.

costs formed 45% of the total case-management costs. Thus, substantial savings would accrue if malaria were eradicated. Good quality case-management is crucial to the efficient use of resources expended on malaria control: if case-management is not done well, less is achieved for a given expense and scarce health resources are wasted.

The Henan government provided important preventive functions for malaria. Population blood surveys were continued in order to detect epidemics arising in the consolidation stage, and accounted for 25% of government costs. The blood surveys incurred high fixed costs and constituted 64% (89 105 yuan/139 568 yuan) of the total cost for this activity. Vector surveillance has high variable costs at 54% (34 488 yuan/64 253 yuan), but it only accounts for 12% of total government costs. It is strategically important for the control or eradication of malaria to maintain and update local knowledge of the vector.

Henan health officials now know the economic costs of all the components of malaria control, enabling them to plan more strategically. The annual government investment of US\$ 111 516 protected 3.4 million people, at a cost of US\$ 0.03 per head. If the government reduces spending, malaria transmission will almost certainly increase and lead to higher costs in the future. The malaria control programme should continue, to prevent and control epidemics, and to maintain the health already attained. ■

### Acknowledgements

Projects 930413 and 950109 *Cost and performance analysis for malaria control in Henan Province*, United Nations Development Programme/World Bank/WHO Special Programme for Research and Training in Tropical Diseases.

**Conflict of interests:** none declared.

## Résumé

### Coût de la lutte antipaludique en Chine : le programme de consolidation dans le Henan selon le point de vue de la communauté et du Gouvernement

**Objectif** Aider à la planification stratégique de l'éradication du paludisme dans la Province de Henan (Chine), où a été atteinte la phase de consolidation de la lutte antipaludique en 1992, date à laquelle seuls 318 cas de paludisme ont été notifiés.

**Méthodes** Nous avons réalisé une étude prospective de deux ans sur les coûts du programme de lutte antipaludique de la Province de Henan. Nous avons utilisé pour cela un modèle de coût qui peut également être appliqué à d'autres programmes de lutte antipaludique en Chine continentale, et avons analysé le coût des trois éléments du programme, à savoir la prise en charge des cas suspects de paludisme, la surveillance des vecteurs et les enquêtes hématologiques en population. Les données primaires sur les coûts ont été obtenues auprès du Gouvernement, et les données sur les cas suspects ont été recueillies dans deux districts touchés par le paludisme (2 093 100 habitants). Nous avons fait appel à 260 médecins de village dans six municipalités ou ex-

communes (247 762 habitants) et étudié la totalité des 12 325 cas suspects de paludisme notifiés dans la zone desservie par ces médecins en 1994 et 1995.

**Résultats** L'investissement annuel moyen du Gouvernement dans la lutte antipaludique a été évalué à US \$111 516 (prise en charge des cas 59 % ; enquêtes hématologiques 25 % ; surveillance des vecteurs 12 % ; imprévus et projets spéciaux 4 %). Le coût moyen (direct et indirect) pour les patients se faisant soigner pour une suspicion de paludisme était de US \$3,48, soit l'équivalent de 10 jours de revenu pour les résidents des zones rurales. Chaque cas suspect de paludisme coûtait en moyenne au Gouvernement US \$0,78.

**Conclusion** Toute nouvelle réduction des fonds publics augmentera le coût futur de la lutte en cas de retour d'épidémies de paludisme ; l'investissement dans la lutte antipaludique doit donc être maintenu au moins au niveau actuel de US \$0,03 par personne à risque.

## Resumen

### Costo del control del paludismo en China: perspectiva de las comunidades y del Gobierno sobre el programa de consolidación de Henan

**Objetivo** Contribuir mediante la planificación estratégica a la erradicación del paludismo en la provincia china de Henan, donde se alcanzó la fase de consolidación del control del paludismo en 1992, año en que sólo se notificaron 318 casos de la enfermedad.

**Métodos** Realizamos un estudio prospectivo de dos años sobre los costos del programa de lucha antipalúdica de Henan. Para ello utilizamos un modelo de costos que pudiera aplicarse también a otros programas contra el paludismo en la China continental, y analizamos el costo de los tres componentes del programa: manejo de los casos presuntos de paludismo, vigilancia de los vectores, y encuestas hematológicas de la población. Los datos principales sobre los costos se obtuvieron de la Administración, y los datos sobre los pacientes presuntamente afectados proceden de dos distritos con paludismo (2 093 100 habitantes). Conseguimos que nos ayudaran 260 médicos rurales en seis municipios o antiguas comunas (247 762 habitantes), y estudiamos la totalidad de los

12 325 casos notificados de posible paludismo registrados en sus zonas de captación en 1994 y 1995.

**Resultados** Se calculó que la inversión anual media del Gobierno en el control del paludismo ascendía a US\$ 111 516 (manejo de casos, 59%; encuestas hematológicas activas, 25%; vigilancia de vectores, 12%; e imprevistos y proyectos especiales, 4%). El gasto medio (directo e indirecto) para los pacientes que solicitaron tratamiento sospechando que tenían paludismo fue de US\$ 3,48, - suma que para los habitantes de las zonas rurales equivalía a los ingresos de 10 días. Cada caso presunto de paludismo supone para la Administración un gasto medio de US\$ 0,78.

**Conclusión** Todo recorte adicional de los fondos públicos se traducirá en mayores costos en el futuro cuando retorne el paludismo epidémico; por consiguiente, la inversión en la lucha antipalúdica debe mantenerse como mínimo en los niveles actuales de US\$ 0,03 por persona en riesgo.

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