National dengue surveillance in Cambodia 1980–2008: epidemiological and virological trends and the impact of vector control

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Objective Dengue has been reportable in Cambodia since 1980. Virological surveillance began in 2000 and sentinel surveillance was established at six hospitals in 2001. Currently, national surveillance comprises passive and active data collection and reporting on hospitalized children aged 0–15 years. This report summarizes surveillance data collected since 1980.

Methods Crude data for 1980–2001 are presented, while data from 2002–2008 are used to describe disease trends and the effect of vector control interventions. Trends in dengue incidence were analysed using the Prais–Winsten generalized linear regression model for time series.

Findings During 1980–2001, epidemics occurred in cycles of 3–4 years, with the cycles subsequently becoming less prominent. For 2002–2008 data, linear regression analysis detected no significant trend in the annual reported age-adjusted incidence of dengue (incidence range: 0.7–3.0 per 1000 population). The incidence declined in 2.7% of the 185 districts studied, was unchanged in 86.2% and increased in 9.6%. The age-specific incidence was highest in infants aged <1 year and children aged 4–6 years. The incidence was higher during rainy seasons. All four dengue virus (DENV) serotypes were permanently in circulation, though the predominant serotype has alternated between DENV-3 and DENV-2 since 2000. Although larvicide has been distributed in 94 districts since 2002, logistic regression analysis showed no association between the intervention and dengue incidence.

Conclusion The dengue burden remained high among young children in Cambodia, which reflects intense transmission. The national vector control programme appeared to have little impact on disease incidence.

Une traduction en français de ce résumé figure à la fin de l'article. *Al final del artículo se facilita una traducción al español.* الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

Background

Over the past 30 years, dengue fever has emerged as the most important arthropod-borne viral disease of humans worldwide and is a major global public health problem, primarily in the tropics.[1] Infection with one of the four serotypes of the dengue virus often produces a self-limited but painful febrile illness. The illness may be asymptomatic or can involve severe manifestations such as dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS), which may rapidly progress to death, particularly in children. To date, no drugs can cure the disease and no vaccine can prevent it. Dengue control and prevention have mainly relied on vector control and community action.

Dengue is considered endemic in Cambodia, a country with poor health and economic indicators.[2] The estimated population was 14.6 million in 2008.[3] The dengue virus was first detected in Cambodia in 1963[4] and dengue fever has been reported through passive surveillance since 1980. Surveillance was enhanced in 2000 to include laboratory diagnosis for a sample of patients with suspected dengue and, in 2001, with the introduction of active sentinel surveillance.

This report summarizes surveillance data on dengue collected in Cambodia since 1980. Epidemiological trends were determined primarily using data from recent years. In addition, the impact of a 7-year vector control programme on the incidence of the disease was also evaluated.

Methods

Cambodia has a tropical climate, with a rainy season occurring between May and November. Rainfall typically peaks between May and June. Some 80% of the population lives in the southern and north-western parts of the country, which together contain 24 provinces and 185 districts.

National surveillance

National surveillance of dengue was established in 1980 and involved passive reporting of clinically diagnosed cases by public-sector health centres and hospitals. In 2000, virological surveillance was introduced at five hospitals, as described below. Subsequently, in 2001, the system changed dramatically when the National Dengue Control Program (NDCP) implemented

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sentinel surveillance based on three public hospitals and three non-profit-making private hospitals in four provinces. Cases reported through the sentinel system include those among children in either paediatric hospitals or paediatric wards in sentinel hospitals. Thus, national data collected since 2001 were obtained by both passive and active reporting of cases.

Laboratory testing

Virological and serological surveillance is carried out at three of the public hospitals that serve as sentinel sites, a non-profit making private hospital in Siem Reap and an additional public provincial hospital. Paired serum specimens are collected on admission and at discharge from hospitalized patients with clinically diagnosed dengue. The specimens are centrifuged and sent weekly in liquid nitrogen to the Institut Pasteur–Cambodia for serological, virological and molecular testing. In theory, each site should send 5–10 paired serum specimens taken from a random sample of patients with suspected dengue each week throughout the year. In reality, patients are seldom randomly selected and only two sites regularly send specimens throughout the year. The paired serum specimens are tested using an immunoglobulin M (IgM)-antibody capture enzyme-linked immunosorbent assay (ELISA) and a haemagglutination inhibition assay. Because of possible cross-reactivity, all specimens are systematically tested for anti-dengue virus and anti-*Japanese* encephalitis virus IgM using an in-house IgM-antibody capture ELISA and a haemagglutination inhibition assay, as previously described.[5] The first sample is tested for viral ribonucleic acid using a modified version of the reverse-transcriptase polymerase chain reaction (PCR) procedure described by Lanciotti.[6] In addition, the virus is isolated by inoculating sera into C6/36 (*Aedes albopictus* mosquito) and Vero E-6 cell cultures and identifying the virus serotype by using a direct fluorescent antibody assay employing monoclonal antibodies, as described elsewhere.[5]

Case definition and data collection

Since 2002, clinical case definitions of dengue fever and its complications have been based on World Health Organization (WHO) definitions[7,8] and adapted for health centres and referral hospitals. Because resources were limited, the NDCP gathered data reported passively from referral hospitals and collected actively at sentinel sites on only a weekly basis. Data were collected on individual patients using a standard NDCP form, which recorded each patient's name, demographic characteristics, disease severity (i.e. dengue fever, DHF or DSS), district of residence, and vital status or status on transfer. The forms were stored centrally at the NDCP office and data were entered into a computerized database using statistical software (Epi Info 2000 version 3.3.1, Centers for Disease Control and Prevention, Atlanta, United States of America (USA)). A system was in place to check patients' names so that there was no duplication of those who were hospitalized at several different sites for the same illness episode.

Vector control interventions

In theory, since 2001 control of the dengue vector in Cambodia has consisted of biannual larvicide campaigns: 1% temephos sand granules distributed between April and July and between August and October. Medium-to-large water storage containers in households in districts identified by the NDCP as high-risk areas for epidemics were targeted. Targets were mainly in urban centres and densely populated areas. These campaigns were linked to nationwide publicity involving public service announcements on radio and television and in the print media, as well as the use of vehicles with loudspeakers and community meetings before each dengue season. However, because of budgetary constraints, some high-risk districts received only one round of larvicidal treatment between April and July or no treatment at all. Routine vector control activities were also limited and primarily involved community-based clean-up campaigns to remove and destroy small rain-filled containers and insecticide fogging to kill adult mosquitoes around houses close to locations where dengue cases had been reported.

Since the distribution of temephos has not been documented in detail, vector control coverage in each district in the years 2001–2008 was determined by ascertaining whether or not the NDCP intervened in that district in a specific year.

Data analysis

The analysis considered only data recorded and computerized from 2002 onwards because data for 1980–2000 were not collected using a strict clinical case definition for suspected dengue virus infection and data for 2001 were incomplete: 68% of demographic and district-of-residence data were missing. We calculated the age-specific incidence of dengue and the age-adjusted annual incidence per 1000 individuals using population data from the 1998 census.[9] Population estimates for other years were obtained from the Cambodian government's Institute of Statistics.[3] The annual number of cases was treated as a time series and the Prais–Winsten generalized linear regression model was used to calculate the significance of any increase or decrease in dengue incidence between 2002 and 2008, both overall and for each district. A change of slope was judged to be statistically significant using the *F*-statistic if the *P*-value was < 0.05. We assessed the impact of vector control interventions in individual districts by determining their effect on dengue incidence using a logistic regression model that controlled for the population density in each district. The number of vector control interventions was treated as a continuous variable, with the number per district being the number of years that interventions were used in that district. Results were expressed in odds ratios (ORs) and 95% confidence intervals (CIs). All statistical analyses were carried out using Stata 9.2 statistical software (StataCorp LP, College Station, USA).

Results

Secular trend and seasonality

Of the 194 726 cases of dengue reported to the NDCP between 1980 and 2008, 74 947 (38.5%) were passively reported by public health-care facilities before 2001 using non-standardized clinical definitions of dengue. The secular, or long-term, trend was characterized by a cyclical pattern of epidemics at intervals of about 3–4 years. Since the surveillance system was improved in 2001, the 3–4-year cycle has been less prominent. Two major epidemics occurred after 1997: there were 16 260 cases in 1998 and 39 618 in 2007 (Fig. 1).

Trends in incidence 2002–2008

In the period 2002–2008, the NDCP reported between 9006 and 39 618 cases of dengue per year (annual age-adjusted incidence range: 0.7–3.0 per 1000 population), with the case fatality rate ranging from 0.7 to 1.7% (Table 1). Dengue

cases were reported throughout the year, with increases occurring during the rainy season between May and November (i.e. weeks 17–48 in Fig. 2). After taking into account seasonal fluctuations and the major 2007 epidemic, analysis using the generalized linear regression model detected no significant trend in the annual age-adjusted incidence of reported clinical dengue virus infections.

Since the implementation of sentinel surveillance, the proportion of all dengue cases reported that came from sentinel sites has increased from 57.0% in 2002 to 89.1% in 2008 (Fig. 1). For example, in 2008 the two non-profit-making hospitals belonging to the Kantha Bopha Foundation in Siem Reap and Phnom Penh, respectively, accounted for 62.1% of all reported cases. These hospitals provide free medical care to Cambodian children and have large catchment areas.

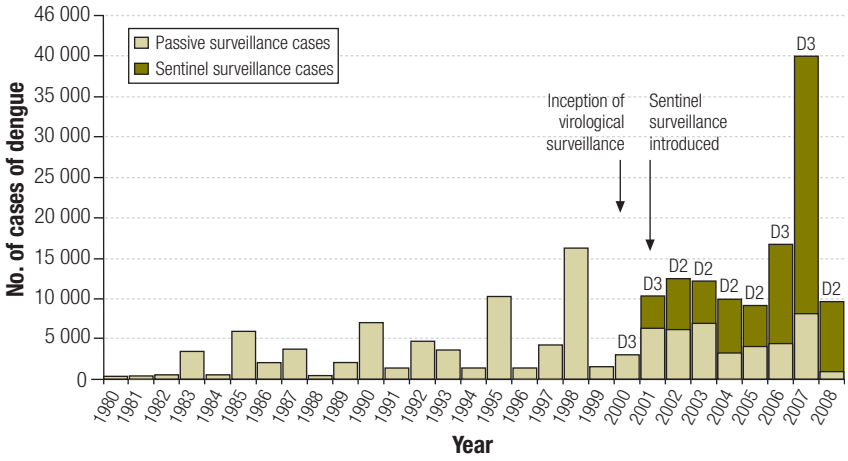
Overall, from 2002 to 2008, the average proportion of clinical dengue virus infections classified as DHF was 41.5% (range: 20.5–54.0), while 6.6% (range: 3.0–8.7) were classified as DSS and the remainder, as dengue fever (Table 1). The proportion classified as either DHF or DSS peaked in 2006, at 60.6%, and in 2007, at 54.2%.

The highest age-specific incidence of dengue fever occurred in infants aged less than 1 year, followed by those aged 4–6 years (Fig. 3). Some 79.0% of all reported cases were in children aged 9 years or younger (median: 6 years). The age distribution of dengue cases has been consistent since 2002. Moreover, no sex difference in incidence was observed in the period since 2002, during which the median proportion of males was 49.3% (range: 47.7–49.6).

Virological findings

Between 2000 and 2008, paired serum samples were collected from an annual mean of 715 patients, who comprised 5.2% of all dengue cases reported. Overall, 87.8% of samples were seropositive for dengue and there was little variation across sentinel sites. On average, 70.0% of seropositive samples also tested positive using PCR. Among seropositive patients aged < 1 year, 78% (i.e. 108 of 138) tested positive using PCR. Although most cases occurred during the rainy season, dengue virus infection was also identified during other times of the year, which confirms that dengue is endemic in Cambodia.

Fig. 1. **Number of cases of dengue fever reported nationally in Cambodia, 1980–2008**



D2, dengue virus type-2 (DENV-2) was predominant in the year; D3, dengue virus type-3 (DENV-3) was predominant in the year.

Since virological testing started in 2000, all four dengue virus serotypes have been observed to be in circulation each year, with DENV-2 and DENV-3 being predominant (Table 1). The predominant circulating serotype changed from DENV-3 to DENV-2 in 2002 and then switched back to DENV-3 4 years later (Fig. 1). Between 2000 and 2008, both the incidence of dengue and the proportion of cases with DHF were highest in 2006 and 2007, when the predominant serotype was DENV-3.

Impact of vector control

Between 2000 and 2008, dengue vector control interventions based on the distribution of temephos, community participation and the provision of educational messages were undertaken in 94 densely populated districts that the NDCP considered to be most affected by the disease. Of these, only 24 (35%) received interventions for 4 years or more (median: 2; range: 1–7). Linear regression analysis showed that the incidence of dengue declined in only 5 (2.7%) of all 185 districts studied between 2000 and 2008, while it remained unchanged in 162 (86.2%) and increased in 18 (9.6%). Two (40.0%) of the five districts in which the incidence declined had received interventions during the previous 7 years compared with 47.5% of districts where the incidence was unchanged and 33.3% where it increased. Logistic regression models, whether controlling for the district population density or not, failed to find any significant association between the use of interventions and decreased incidence.

Discussion

This is the first published report of national dengue surveillance data in Cambodia covering a period of 28 years. As the data for 1980–2000 were not collected using a strict clinical case definition for suspected dengue virus infection, we focused on the 2002–2008 period, during which more complete and reliable data on patients and the virus serotype were available.[10] The estimated incidence of dengue nationally was high, varying from 0.7 to 3.0 per 1000 population during 2003–2008. Generally there was no change in the overall age-adjusted annual incidence during 2002–2008, although there was a spike in case numbers in 2007. The data also show that dengue remains prevalent among young children in Cambodia, with infants aged < 1 year and children aged 4–6 years being the most affected. The age distribution of dengue cases in other countries in the region showed wide variations. In Thailand and Viet Nam, dengue has become more common in older children.[11–14] A prospective cohort study of children aged 3–15 years in southern Viet Nam found that the incidence was highest in those aged 6–10 years (L Pollissard, personal communication, 2007). In Malaysia and Singapore, in contrast, most cases were seen in adults aged over 18 years.[15,16] The reasons for these differences may include the level of development,[17] the effectiveness of vector control programmes,[15] the predominance

Table 1. **Cases of dengue fever, dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS) reported by the National Dengue Control Programme, Cambodia, 2000–2008**

Parameter	Year of surveillance								
	2000	2001	2002	2003	2004	2005	2006	2007	2008
DF cases, no.	3145	10266	12441	12099	9991	9006	16635	39618	9546
DHF, %[a]	ND	ND	27.8	20.5	41.5	34.6	54.0	51.2	42.9
DSS, %[a]	ND	ND	5.4	7.0	8.7	8.4	6.6	3.0	3.6
DHF and DSS, %[a]	ND	ND	33.2	27.5	50.2	43.0	60.6	54.2	46.5
DF case fatality rate, %	ND	ND	1.2	1.6	0.9	1.7	0.9	1.0	0.7
Age-adjusted incidence (per 1000 population)									
Of DF	ND	ND	1.02	0.97	0.78	0.69	1.27	2.96	0.70
Of DHF and DSS	ND	ND	0.34	0.27	0.39	0.30	0.77	1.60	0.32
Age-specific incidence of DHF and DSS (per 1000 population)									
<1 yr	ND	ND	0.45	0.25	0.59	0.61	2.43	5.49	1.01
1–4 yr	ND	ND	0.58	0.71	1.00	0.72	2.15	4.07	0.77
5–9 yr	ND	ND	1.22	0.77	1.14	0.91	2.21	4.41	0.86
10–14 yr	ND	ND	0.54	0.44	0.65	0.42	0.98	2.30	0.54
15–19 yr[b]	ND	ND	0.00	0.01	0.01	0.03	0.05	0.27	0.07
Clinical cases tested									
No.	415	748	809	677	680	527	575	1400	598
%	13.2	7.3	6.5	5.6	6.8	5.9	3.5	3.5	6.3
Clinical cases that tested positive for DF									
No.	324	603	736	617	611	467	510	1315	509
%	78.1	80.6	91.0	91.1	89.9	88.6	88.7	93.9	85.1
Clinical cases that tested positive with PCR[c]									
No.	191	375	468	444	374	310	381	1095	358
%	59.0	62.2	63.6	72.0	61.2	66.4	74.7	83.3	70.3
Specific virus serotype, %									
DENV-1	5.6	23.3	21.0	10.4	3.3	5.5	5.7	4.3	10.8
DENV-2	24.4	20.1	41.0	61.2	74.1	45.3	9.2	9.1	44.1
DENV-3	58.9	45.0	18.0	15.5	16.7	39.4	82.2	83.6	19.7
DENV-4	11.1	11.6	20.0	12.9	5.9	9.7	2.9	3.1	25.4

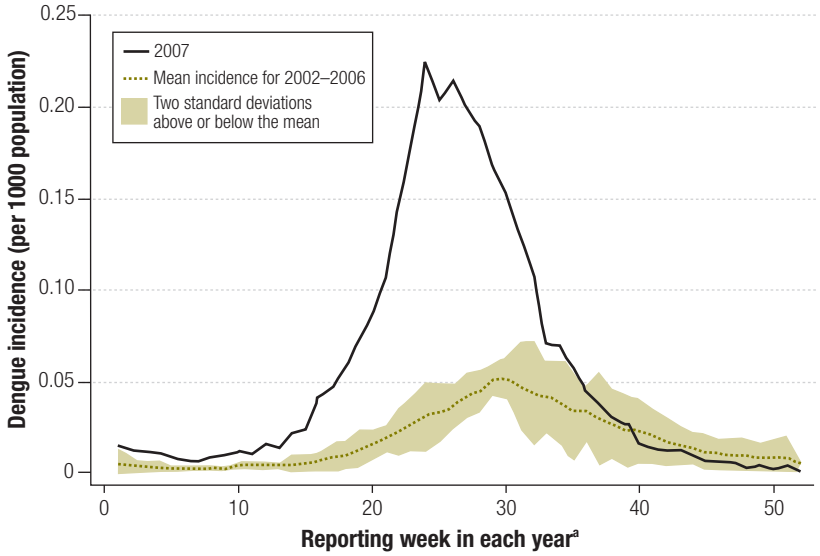
ND, not determined; DENV, dengue virus; DF, dengue fever; DHF, dengue haemorrhagic fever; DSS, dengue shock syndrome; PCR, polymerase chain reaction.
[a] This represents the percentage of cases among all reported cases of dengue fever.
[b] There was no requirement to report dengue in those aged 15–19 years.
[c] Among cases that tested positive for DF.

of different virus genotypes[18] and a demographic transition or shift.[19]

Significantly, the alert system for detecting epidemics established by the NDCP and modelled on the early warning system for malaria[20] predicted the occurrence of the 2007 epidemic. As shown in Fig. 2, the weekly dengue incidence was consistently above the alert threshold of two standard deviations above the mean in early 2007, while it remained below the threshold in other years. Although the authorities were quickly alerted, the response to the outbreak, which included vector control interventions, educational messages and providing public hospitals with sufficient medical supplies, came too late. Unfortunately, the NDCP has too few human resources and too little funding to implement these interventions in a timely manner.

Although all four dengue virus serotypes were circulating in the country throughout the reported surveillance period, illness was predominantly caused by DENV-2 and DENV-3. The change in the predominant serotype from DENV-3 to DENV-2 in 2002 resulted in only a small increase in incidence, possibly because DENV-2 had been circulating in earlier years and many Cambodians had developed immunity. The incidence declined steadily between 2002 and 2005, until a large-scale epidemic due to DENV-3 occurred in 2006–2007. We speculate that there is a 3–4 year cyclical pattern of epidemics in Cambodia involving different serotypes, with epidemics of the same serotype possibly occurring every 8–9 years (e.g. in 1998 and 2006–2007). Indeed, unpublished laboratory data from the Institut Pasteur–Cambodia and the large-scale DENV-3 epidemic observed regionally in 1998[21–26] indicate that the serious 1998 epidemic which disrupted the Cambodian health system by overloading hospitals[27] was due to DENV-3. Moreover, in the 2006–2007 epidemics in Cambodia, the DENV-3 virus was associated with a high proportion of severe complications (i.e. DHF and DSS). In Thailand, DENV-3 was also predominant during the severe dengue years of 1987 and 1998.[21] Further studies, which should include full genome sequencing, are needed to explore the association

Fig. 2. **Incidence of dengue fever in 2007 and mean incidence for 2002–2006, by reporting week, Cambodia**



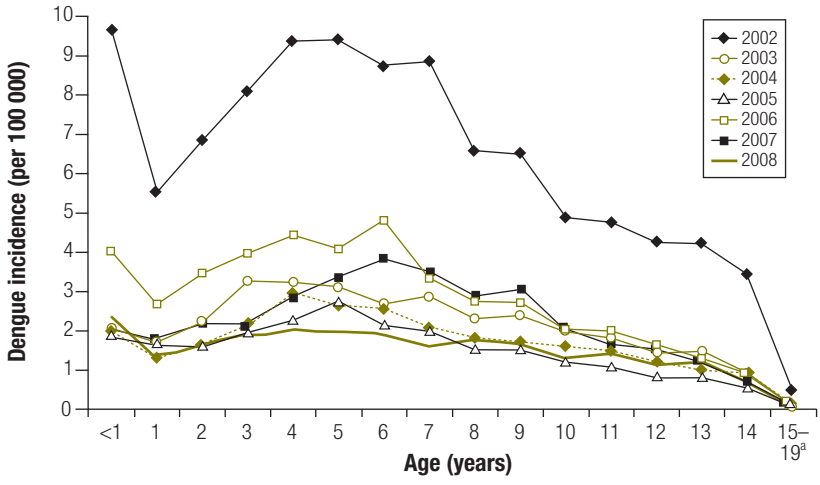
[a] The first reporting week is the first week in January.

between dengue serotype, virus virulence and disease severity.

Several studies have shown that vector control interventions reduce larval indices though the reduction must be substantial to influence dengue transmission.[28–30] In Cuba and Singapore, the incidence of dengue was dramatically reduced only after anti-vector legislation was introduced and aggressive vector control measures had been used for years.[31] Nevertheless, dengue has re-emerged because new dengue viruses are constantly being introduced from neighbouring countries.[15,32] In this study, we evaluated the impact of many years of vector control interventions and educational messages on the incidence of dengue in individual districts. No association between such interventions and disease incidence was observed. Clearly, as dengue transmission is highly localized, a more rigorous assessment of interventions would consider outcomes at the village level, but this information was not available.[33] We are not suggesting that temephos does not prevent transmission at the household level, but rather that, given the limited resources, it is unlikely that current interventions in Cambodia will affect disease incidence.

In Cambodia, dengue viruses are transmitted primarily by *Aedes aegypti* mosquitoes (C Paupy, personal communication, 2002), which are abundant in populated rural areas.[34] Over 80% of larval foci for this species are in the ubiquitous, concrete jars filled with rainwater used in most homes. Unfortunately, the quantity of parricides available to the NDCP has been insufficient to cover all high-risk areas thoroughly and there was little reduction in dengue transmission. The long-term strategy for implementing vector control programmes in Cambodia needs to be re-examined.

Fig. 3. **Age-specific incidence of dengue fever, Cambodia, 2002–2008**



[a] There was no requirement to report dengue in those aged 15–19 years.

The use of surveillance data to describe epidemiology and evaluate disease burden has several limitations. In particular, there are weaknesses in the design of the surveillance system resulting from the need to balance limited resources and data quality. For example, surveillance only covered patients hospitalized at major public and non-profit-making paediatric hospitals and paediatric wards to ensure the accuracy of dengue diagnosis. Moreover, clinicians at our surveillance sites often had difficulty in classifying disease severity using standard WHO definitions (Institut Pasteur–Cambodia, unpublished data, 2007). Improving diagnosis by obtaining complete blood counts or carrying out radiographic or ultrasound imaging is often too technically difficult or too expensive for most health-care facilities in Cambodia. The presence of haemoconcentration, suggestive of DHF, is also difficult to detect because Cambodian clinicians tend to administer fluids intravenously as soon as dengue is suspected.[35]

The size of the patient samples used in virological surveillance was small. Moreover, patients suspected of having dengue were not selected randomly but rather because there was a high level of suspicion that they had severe dengue. Another limitation was that dengue was frequently overdiagnosed during epidemics and underdiagnosed during the intervening periods. The use of laboratory testing in dengue diagnosis is clearly vital when resources permit. We believe that, in the absence of systematic laboratory diagnosis of dengue, surveillance programmes should exclude patients with undifferentiated febrile illnesses to increase the specificity of diagnosis by avoiding the inclusion of those with, for example, influenza, typhoid or leptospirosis.[36,37]

Despite these limitations, our observation that dengue activity patterns for different ages and genders have remained consistent over time indicates that the

surveillance data are reliable. Moreover, no other data available match the completeness or cover the same timescale as the Cambodian national dengue surveillance data.

Another aim of this article was to make the Cambodian surveillance data publicly available for comparison with other surveillance data in the hope that this will lead to better understanding of the pattern of dengue transmission in the region. Currently, however, descriptive national data are difficult to obtain. Differences in the surveillance systems used in other countries must be taken into account. For example, in Malaysia and Singapore, all suspected dengue cases are confirmed by laboratory testing, whereas only hospitalized patients are tested in the Philippines and Thailand. In Viet Nam, as in Cambodia, only a sample of patients suspected of having dengue undergo serological or virological testing and it is not clear whether these patients are representative of the general population. In contrast, in the Philippines and Viet Nam, all clinically diagnosed dengue cases at all health-care facilities, including health centres and hospitals, are reported.[38]

With the development of dengue vaccines expected in the near future,[39,40] there is an urgent need to accurately estimate the true disease burden. Several countries are collaborating with the Paediatric Dengue Vaccine Initiative of the International Vaccine Institute in Seoul, the Republic of Korea, to set up community-based surveillance sites to measure the incidence of dengue accurately. ■

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ملخص

الوطني لحمى الدنج في كمبوديا 1980 – 2008: الاتجاهات الوبائية والفيروسية وتأثير مكافحة الناقل

الغرض يجري التبليغ عن حمى الدنج في كمبوديا منذ عام 1980. وبدأ الترصد الفيروسي هناك عام 2000، وتأسس الترصد المخفري في ستة مستشفيات عام 2001. ويتكون حالياً الترصد الوطني من جمع معطيات فاعل ولا فاعل والتبليغ عن الأطفال في المستشفيات في عمر 0-15 سنة. ويلخّص هذا التقرير معطيات الترصد التي جمعت منذ عام 1980.

الطريقة عُرضت المعطيات الخام خلال الفترة 1980-2001، بينما استخدمت المعطيات خلال الفترة 2002-2008 لوصف اتجاهات المرض وتأثير التدخلات الخاصة بمكافحة الناقل. وحُللت اتجاهات وقوع حمى الدنج باستخدام نموذج التحوف الخطي العام لباريس-ونستون Prais–Winsten للتسلسل الزمني.

الموجودات خلال الفترة 1980-2001، وقعت أوبئة في دورات استمرت لمدة 3-4 سنوات، وعقب ذلك أصبحت الدورات أقل وضوحاً. وبالنسبة للمعطيات خلال الفترة 2002-2008، كشف تحليل التحوف الخطي عن عدم وجود اتجاه ملموس في معدل الوقوع السنوي المصحح حسب العمر المبلغ عنه لحمى الدنج (مدى معدل الوقوع: 0.7-3.0 لكل 1000 فرد من السكان). وتراجع معدل الوقوع في 2.7% من 185 منطقة خاضعة للدراسة، ولم يتغير في 86.2% من المناطق، وازداد في 9.6% من المناطق. وكان أعلى معدل وقوع خاص بعمر معين بين الرضّع أقل من عمر سنة واحدة والأطفال في الفئة العمرية 4-6 سنوات. وكان معدل الوقوع أعلى في مواسم الأمطار. وكانت جميع الأنماط المصلية الأربعة لفيروس الدنج في دوران مستمر، ولكن النمط المصلي السائد كان يتراوح بين النمط الثالث DENV-3 والنمط الثاني DENV-2 منذ عام 2000. وبالرغم من القيام بتوزيع مبيدات اليرقات في 94 منطقة منذ عام 2002، لم يُظهر تحليل التحوف اللوجستي ارتباطاً بين هذا التدخل ومعدل وقوع حمى الدنج.

الاستنتاج ظل عبء حمى الدنج مرتفعاً بين صغار الأطفال في كمبوديا، مما يعكس انتقالاً مكثفاً للعدوى. ويبدو أن البرنامج الوطني لمكافحة الناقل ذو تأثير قليل على معدل وقوع المرض.

Résumé

Surveillance nationale du dengue au Cambodge 1980–2008 : tendances épidémiologiques et virologiques, et impact du contrôle des vecteurs

Objectif La dengue est une maladie à déclaration obligatoire au Cambodge depuis 1980. La surveillance virologique a commencé en 2000 et une surveillance sentinelle a été établie dans six hôpitaux en 2001. Actuellement, la surveillance nationale comprend un recueil passif et actif des données et la déclaration des enfants de 0-15 ans hospitalisés. Le présent rapport résume les données de surveillance recueillies depuis 1980.

Méthodes Les données brutes de 1980-2001 sont présentées, alors que les données de 2002-2008 sont utilisées pour décrire des tendances de la maladie et l'effet des interventions au niveau du contrôle du vecteur. Les tendances sur l'incidence de la dengue ont été analysées par la méthode des moindres carrés généralisés (Prais-Winsten) pour séries chronologiques.

Résultats Pendant les années 1980-2001, les épidémies se sont produites en cycles de 3-4 ans, les cycles devenant moins évidents par la suite. Pour les données de 2002–2008, l'analyse de régression linéaire n'a détecté aucune tendance significative de l'incidence annuelle déclarée de la dengue ajustée selon l'âge (fourchette d'incidence: 0,7-3,0 par 1 000 habitants). L'incidence a décliné dans 2,7% des 185 districts étudiés, elle a été inchangée dans 86,2% et elle a augmenté dans 9,6%. L'incidence spécifique de l'âge a été plus élevée chez les nourrissons de < 1 an et les enfants de 4-6 ans. L'incidence a été plus élevée pendant la saison des pluies. Les sérotypes des quatre virus de la dengue (DENV) ont circulé en permanence. Toutefois, le sérotype prédominant a alterné entre DENV-3 et DENV-2 depuis 2000. Bien qu'un larvicide ait été distribué dans 94 districts depuis 2002, l'analyse de régression logistique n'a montré aucune association entre l'intervention et l'incidence de la dengue.

Conclusion Le fardeau de la dengue est resté élevé parmi les jeunes enfants au Cambodge, ce qui reflète une transmission intense. Le programme national de contrôle du vecteur apparaît comme ayant peu d'impact sur l'incidence de la maladie.

Resumen

Vigilancia nacional del dengue en Camboya entre 1980 y 2008: tendencias epidemiológicas y virológicas e impacto del control de vector

Objetivos La declaración del dengue ha sido obligatoria en Camboya desde 1980. La vigilancia virológica se inició en el año 2000 y la vigilancia centinela se fijó en 2001 en seis hospitales. En la actualidad, la vigilancia nacional comprende la recopilación de datos activos y pasivos y la presentación de informes de niños hospitalizados de entre 0 y 15 años. Este informe resume los datos de vigilancia recopilados desde 1980.

Métodos Se presentan los datos brutos desde 1980 hasta 2001 y los datos obtenidos entre 2002 y 2008 se emplean para describir las tendencias de la enfermedad y el efecto de las intervenciones para el control del vector. Las tendencias de la incidencia del dengue se analizaron con el modelo básico de regresión lineal de Prais-Winsten para las series temporales.

Resultados Entre 1980 y 2001 se produjeron epidemias en ciclos de 3-4 años, siendo los ciclos siguientes menos destacados. El análisis de regresión lineal no detectó, en los datos comprendidos entre 2002 y 2008, ninguna tendencia significativa en la incidencia anual del dengue comunicada y ajustada por edades (intervalo de incidencia: 0,7–3,0 por 1000 habitantes). La incidencia disminuyó en un 2,7% de los 185 distritos estudiados, se mantuvo sin cambios en el 86,2% y aumentó en el 9,6%. La incidencia específica por edades fue mayor en los lactantes menores de un año y en los niños de entre cuatro y seis años. La incidencia fue mayor en épocas de lluvia. Los cuatro serotipos del virus del dengue (VDEN) estuvieron en circulación de forma permanente, si bien el serotipo predominante se fue alternando entre el virus DEN-3 y el DEN-2 desde el año 2000. A pesar de que se han distribuido larvicidas en 94 distritos desde el año 2002, el análisis de regresión logística no mostró relación alguna entre dicha intervención y la incidencia del dengue.

Conclusión La carga del dengue siguió siendo elevada entre los niños pequeños en Camboya, lo que refleja su elevada transmisión. El programa nacional para el control de vectores tuvo poco impacto sobre la incidencia de la enfermedad.

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