

Special Topic: Operational Research

Chair: Dr. Tereza M. Lyra, Municipal Health Department, Recife, Pernambuco, Brazil



HealthMapper for LF & Other Neglected Diseases in Brazil: Results after Two Years of Use—Where Should We Go with This Technology in the Americas?

Dr. João Batista F. Vieira, and Walter Massa Ramalho, Secretariat for Health Surveillance (Secretaria de Vigilância em Saúde; SVS), Ministry of Health (MoH), Brazil

Overview

HealthMapper provides a system for geo-processing material specifically for the topic of health. It was launched some years ago as public domain software and has been used in Brazil over a period of two years. Training was conducted in the Dominican Republic (DOR). Upon participants' return to their countries, many technical problems were experienced. Therefore, Dr. Walter Ramalho, from the SVS of the Brazilian MoH, conducted a special training session in Ecuador. Another training session was held in Maceió, for personnel at the Secretariat of Health, among others. The most valuable output in Maceió was the preparation of cartographic maps to the city-block level. This was very labor-intensive but Dr. Ramalho and the rest of the Brazilian team intend to continue to try to use the program (in Recife, Olinda, and Jaboatão).

Challenges

HealthMapper was supposed to be relatively user-friendly, but after two years of use it appears to not be as simple as expected. Although initial use of the software may have seemed simple, there have since been several delays in the application of the program. Obstacles blocking the efficient use of the software included the following:

- 1st trial (metropolitan area of Recife)
 - general
 - basic maps not available as desired
 - clear need for more specialized knowledge
 - technical
 - need for specialized technical knowledge to deal with some aspects that require programming capacity, such as adjusting program settings for local conditions
 - problems with linking archives
- 2nd trial (Maceió)
 - general
 - training of local personnel
 - preparation of cartographic charts at city-block level proved extremely labor-intensive

Several problems—both general and technical (software-related)—have delayed the definitive implementation of *HealthMapper*. First, it was discovered that the proper use of *HealthMapper* requires some specialized technical knowledge as well as some programming capacity (e.g., for adjusting the program to local conditions). Technical problems were experienced with linking archives, and producing detailed maps to the desired sub-municipal or city-block level proved extremely labor-intensive. *HealthMapper's* lack of compatibility with specific databases (regarding charts) and the program team's lack of access to compatible databases (those with the appropriate

cartographic grids) was also a constraint. Further, successful use of the program's cartographic grid and the related morbidity data, by city block, revealed the need for specialized knowledge (in use of Microsoft Access) to add intermediate treatments of mass drug administration (MDA).

Output

Several illustrations were prepared in *HealthMapper* for the Brazilian program, including a thematic map of Brazil (see Figure

1); national morbidity data, mapped by city blocks where detected patients live (see Figure 2); hemoscopic surveys in metropolitan Recife (2001–2003), mapped at the municipal level (see Figures 3–6); morbidity surveys at the Maceió focal point, mapped at the both municipal level, and the city block level (see Figure 7); the Reginaldo Canal (an endemic area); a cartographic grid drawing of the Maceió focal point, block by block; and a grid of city blocks with a satellite image overlay. This work was difficult and labor-intensive.

Figure 1. Map of Brazil with embedded indicator

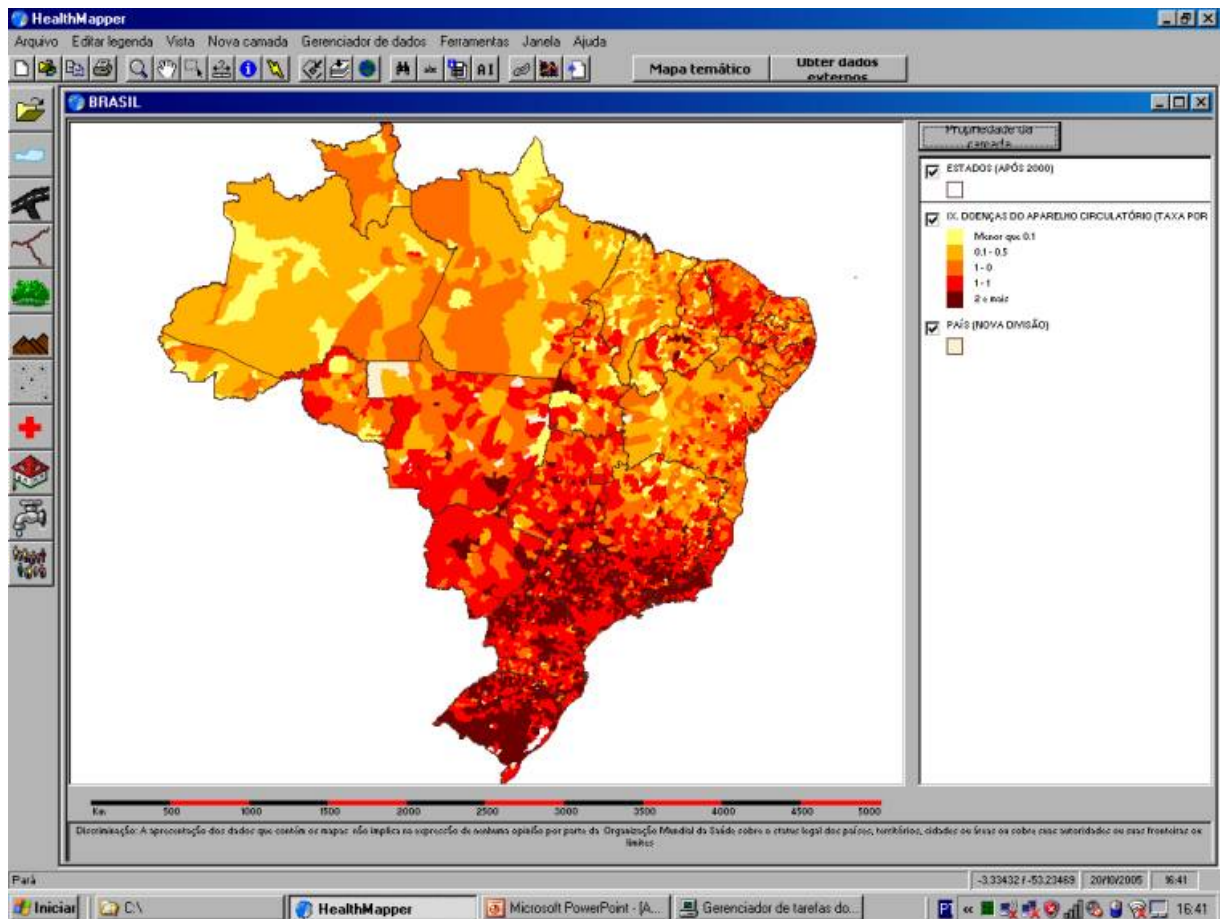


Figure 2. Municipalities in Brazil with visceral leishmaniasis (>20 cases/100,000)

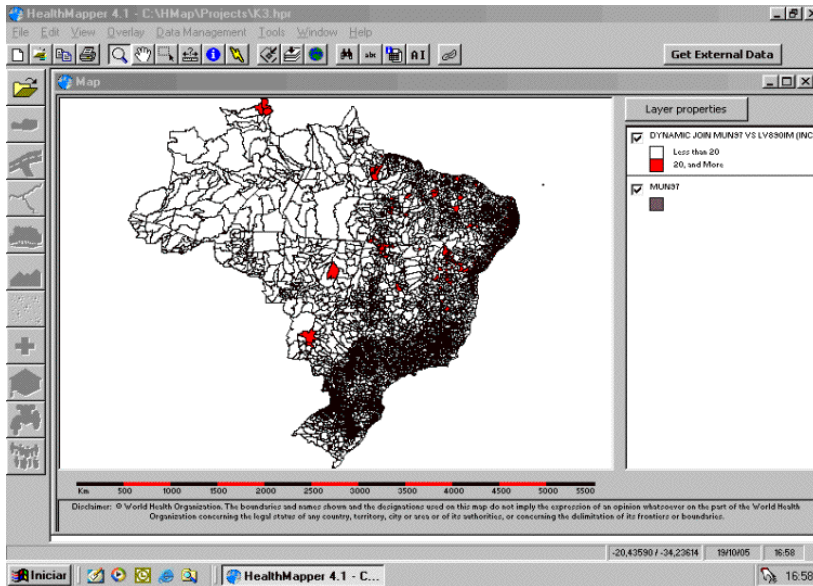


Figure 3. Hemoscopic surveys (metropolitan Recife): 2001

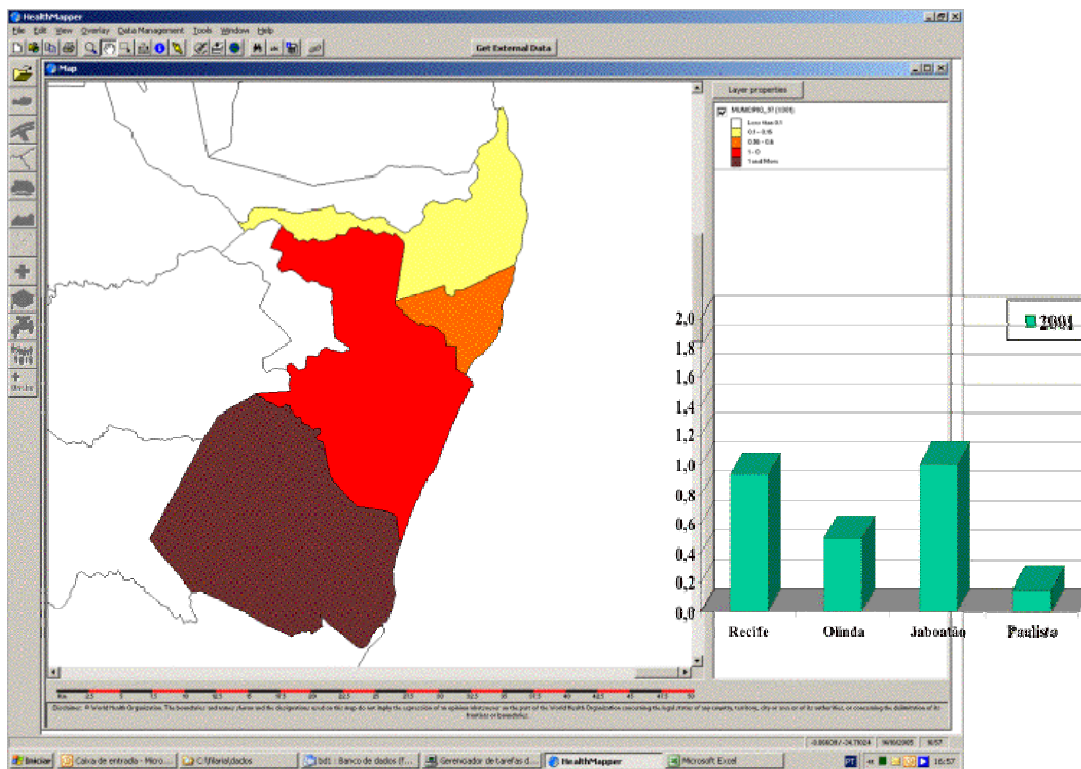


Figure 4. Hemoscopic surveys (metropolitan Recife): 2002

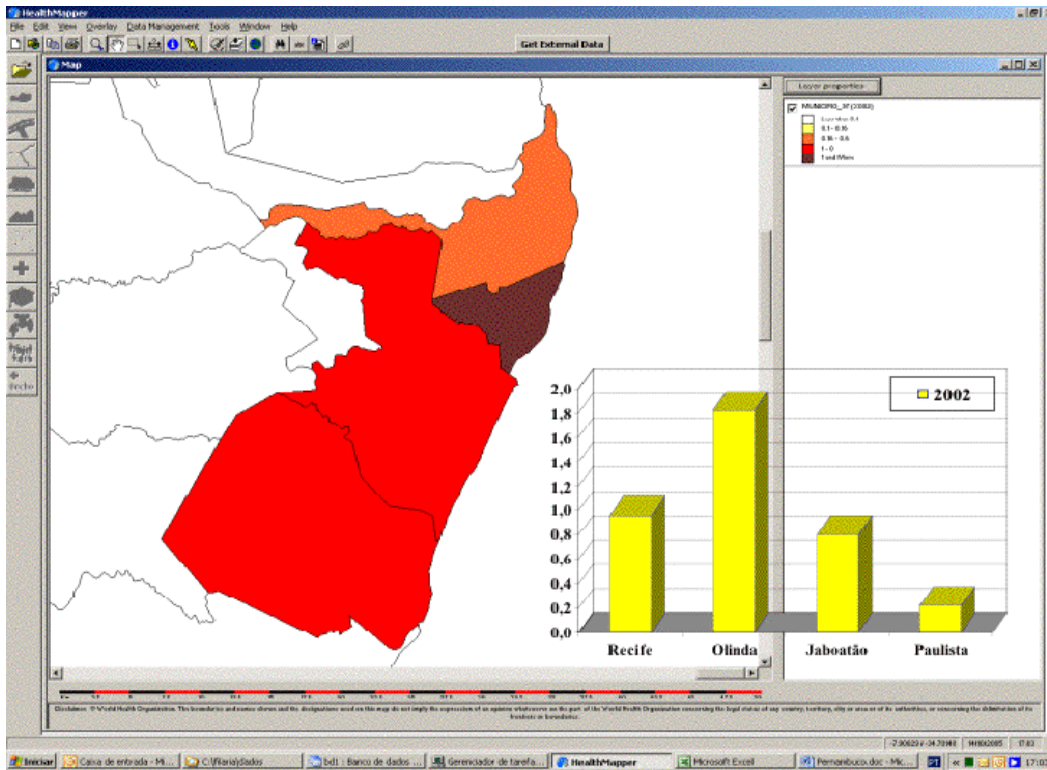


Figure 5. Hemoscopic surveys (metropolitan Recife): 2003

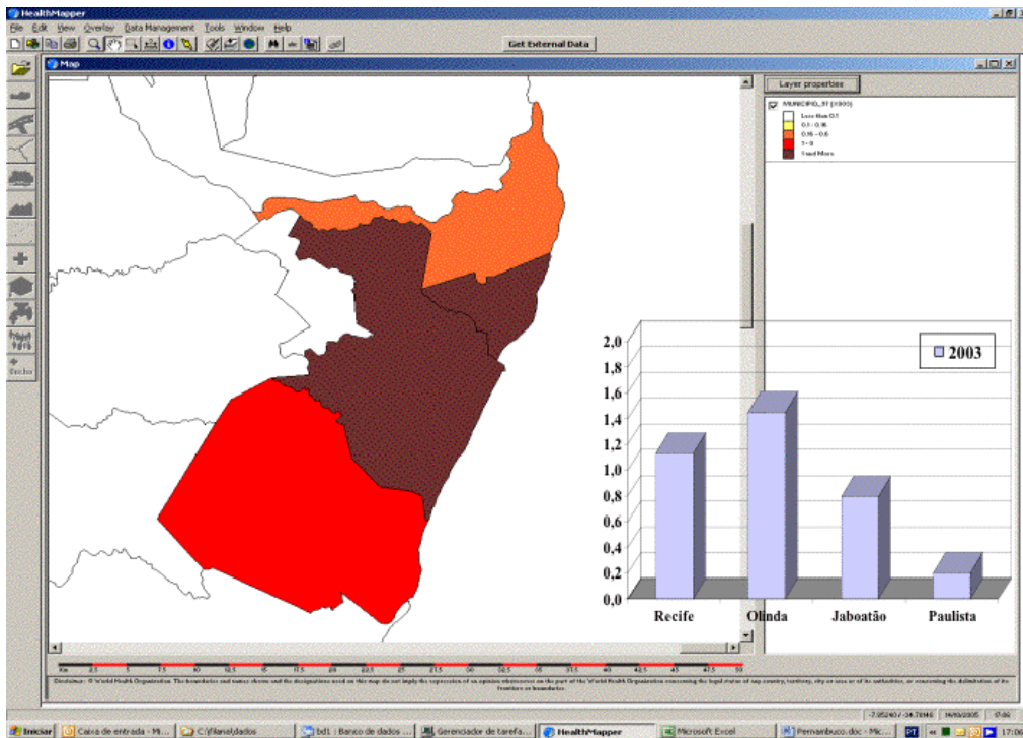


Figure 6. Hemoscopic surveys (metropolitan Recife): 2004

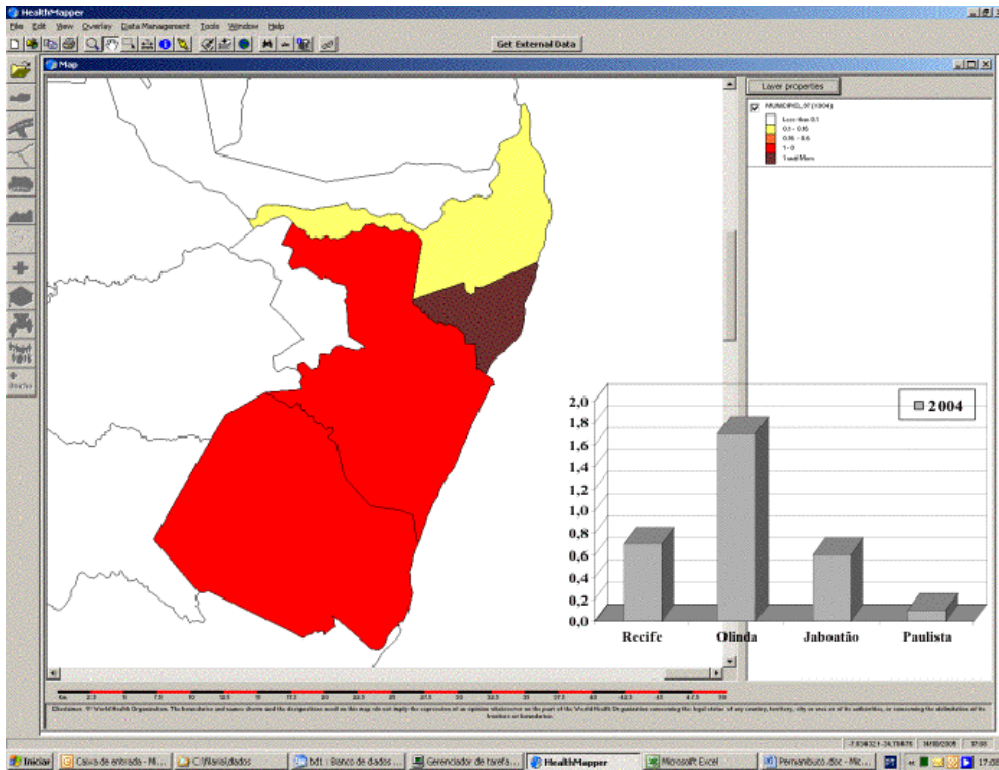
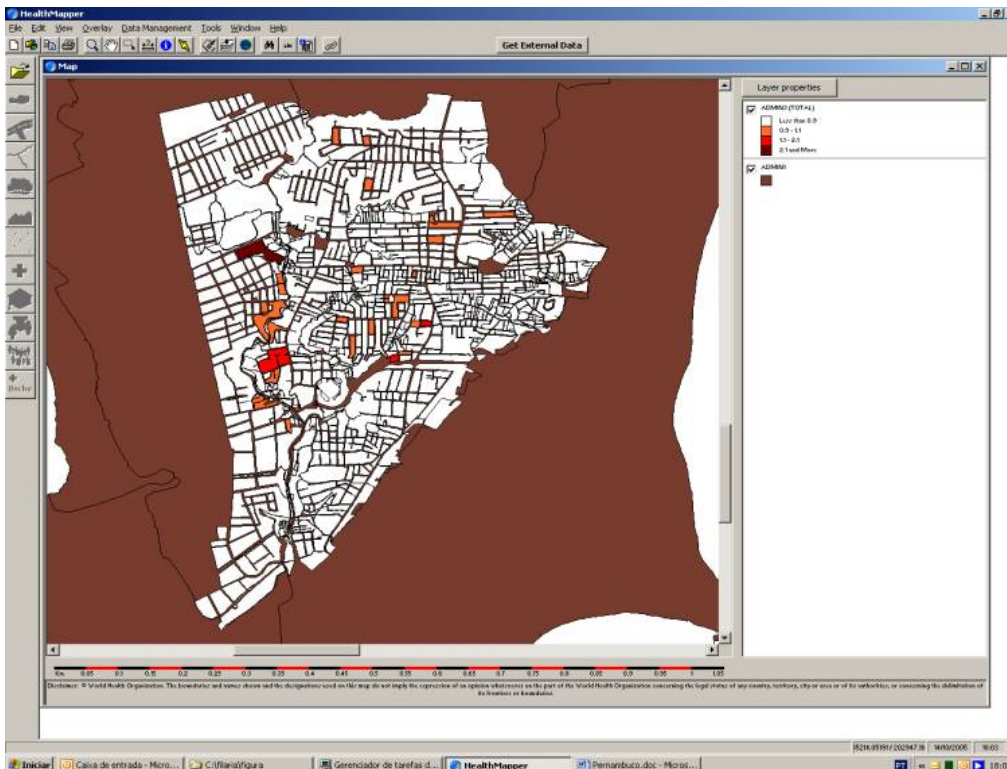


Figure 7. Morbidity survey at Maceió focal point (2005) by city block



DISCUSSION

Question. What would be the challenges or requirements in creating this type of output for municipalities, as opposed to states?

Response. The main problem would be that the municipalities will need to conduct some type of unit analysis, and unless there is an existing drawing, it would need to be constructed. But this is already in the planning stage. Dr. Ramalho plans to conduct a training session for the Secretariats of Health in the three areas or municipalities of the metropolitan region to familiarize the technicians with the commands and resources of *HealthMapper*.

Question. Apparently *HealthMapper* contains very detailed information, and according to the presentation, highly detailed coordinates cannot be imported. So how was the *HealthMapper* program imported? Were the databases separated?

Response. A cartographic design was done in another program and then transported into *HealthMapper*; it is highly detailed and it is working.

Comment. Other geo-processing programs may be more user-friendly for this type of work, but there are still some useful applications for *HealthMapper* in respect to the Programs to Eliminate Lymphatic Filariasis (PELFs).

Question. Considering that there are three levels below the municipalities that are used administratively in the cities in Brazil, how difficult would it be to move down from the level of the city to that of the *barrio* (or to whatever is the next-lowest level)?

Response. Most cities in Brazil already have cartographic drawings of the lower-level grids, at least for the most feasible survey areas. The problem is that the more analysis that is needed, the more it is necessary to drop down to another level in the mapping, which increases the difficulties in drawing the cartographic grid. These mapping problems are a major constraint.

Question. Is *HealthMapper* already widely used, or are most geo-processing users accustomed to other programs? Once users become familiar with *HealthMapper*, do they actually use it?

Response. It seems as if they are. In his training sessions, Dr. Ramalho explains that there are other uses beyond lymphatic filariasis (LF), because interest in the LF application alone appears to be weak. Although there has been a great proliferation of other geo-processing software (e.g., the Brazilians have three) and there are many programs people may be more accustomed to using (e.g., *MapInfo*, or *ArViem*), they are very expensive. So *HealthMapper* has the advantage in terms of cost. And *HealthMapper* also provides built-in indicators and a health data manager.

Comment. As general information [re: other programs], the area in Central America referred to as Mesoamerica (Mexico and Central America up to Panama) is developing alternative projects for control of the malaria vector without the use of DDT (dichloro-diphenyl-trichloroethane). One project, financed by the United Nation's Global Environment Facility (GEF) and the Division of Environmental Protection, is managed by PAHO (Pan American Health Organization). One of the components is the development of a demo area such as Mexico (the only country, until 1998, with the signing of the North American Free Trade Treaty (NAFTA), that utilized DDT in programs of malaria control). For this project Mexico must conform to the regulations of the NAFTA Commission of Environmental Cooperation (Mexico, the United States, and Canada), which designed the project with Mexico's Division of Epidemiology on alternative methods of control of malaria vector. They saw the opportunity for participation by the other Central American countries (although they have not used DDT for more than 20 years) and the study got directed toward the environmental sector in those countries, in the biological control departments.

The baseline data is supported by a geographic information system (GIS) used in PAHO's Health Monitoring and Control Unit by the person who designed SIGEPI¹ (System of Information for Geographic Epidemiological Evaluation). SIGEPI can be used in many other programs. The group from the PAHO will be training staff from Central American countries that have a demo area or are identifying households in localities of the demo area. Procurement of the program includes technical support from PAHO.

¹ The Secretariat urged anyone with an interest in examining SIGEPI to contact him or the in-country PAHO focal point regarding procurement of the program.



The Case of Belém, Pará, Brazil: Focal History from Discovery in the 1950s to Elimination in the New Millennium

Dr. Reinaldo Braun, Coordinator, Municipal Program of Filariasis, Division of Control of Endemic Diseases, Health Surveillance Department, Municipal Health Secretariat, Belém, Pará, Brazil

Introduction

Dr. Braun thanked PAHO (Pan American Health Organization) and its representatives, especially Dr. Steven Ault and Dr. Celsa Sampson, for the invitation to present at the meeting and for the opportunity to show the output of several generations of health studies in the area of endemic diseases, and of national institutions of public health in Brazil (many of them now obsolete), as well as the contributions of the researchers who participated.

Overview

The case of Belém is rather unique. The focal point of Belém was discovered in the 1950s, or actually the 1940s, when a survey was carried out examining 5,000 people. *Microfilaria* (mf) prevalence was 10.8% among those examined. This study showed that lymphatic filariasis (LF) was a serious public health problem. In the 1950s work was initiated to evaluate the extension of this focal point and to determine which measures of control should be applied.

City profile

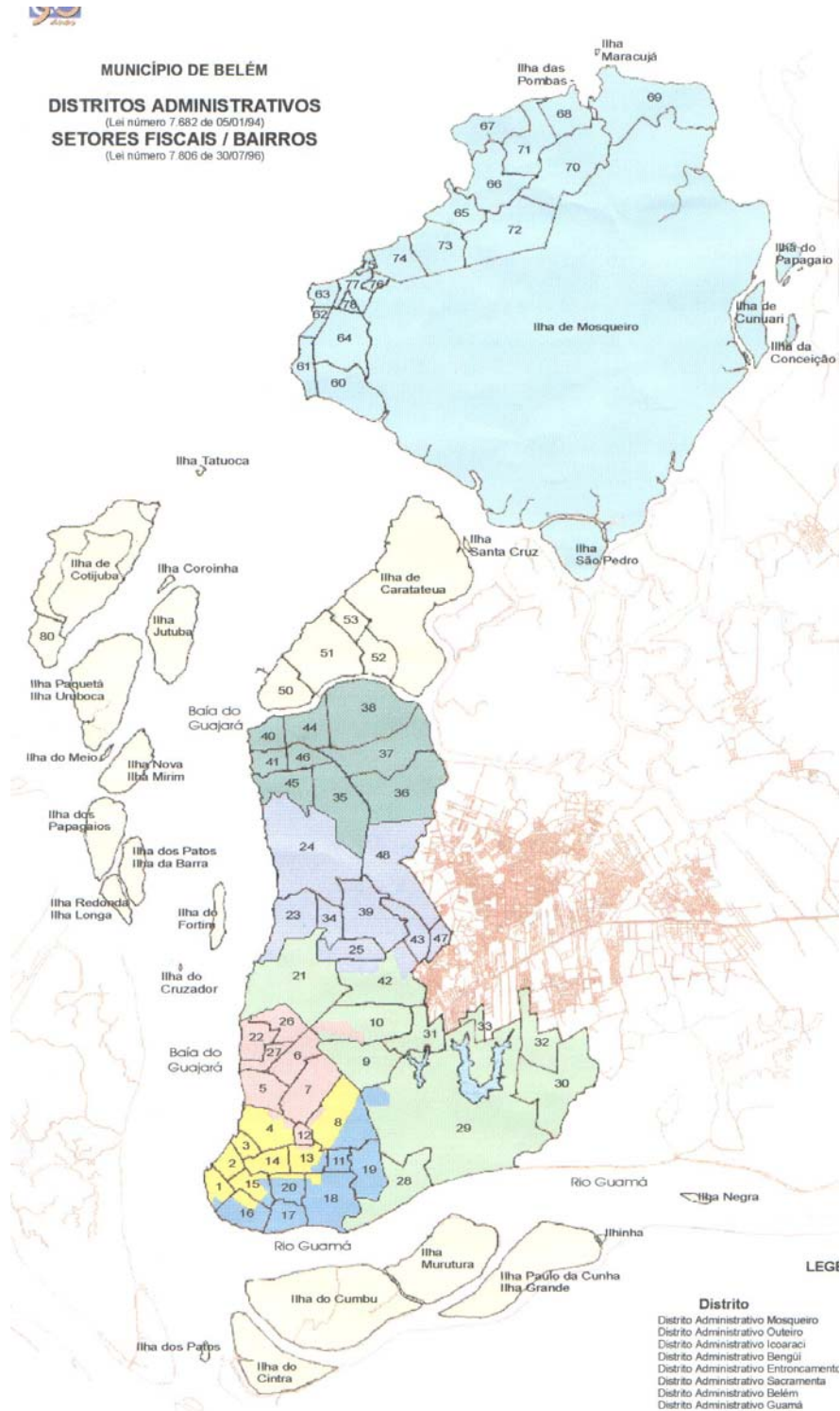
The municipality of Belém is divided into eight administrative districts (see Figure 1). It has a total area of 506 km² (about 242 km² urban areas and 263 km² rural areas), and a total population of 1,281,279 (1,273,018 urban and about 8,000 rural inhabitants), according to 2002 data from the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*, IBGE).

History

1951–2005

In 1952, when prevalence was first detected, LF was a serious problem because of the high index of mf-positives. Apparently it was common, according to the literature, to see people deformed by elephantiasis in the streets. At one point it was estimated that there was 1 mf-positive for each 5 inhabitants of the city. During this epoch, Belém was characterized as the largest focal point of LF in Brazil. The highest number of cases was detected in 1958 (see Figure 2), with more than 14,000 people infected, and by 1977 surveys covered almost 80% of the population of the city.

Figure 1. City of Belém administrative districts (as per Law #7.682 of 01/05/94)

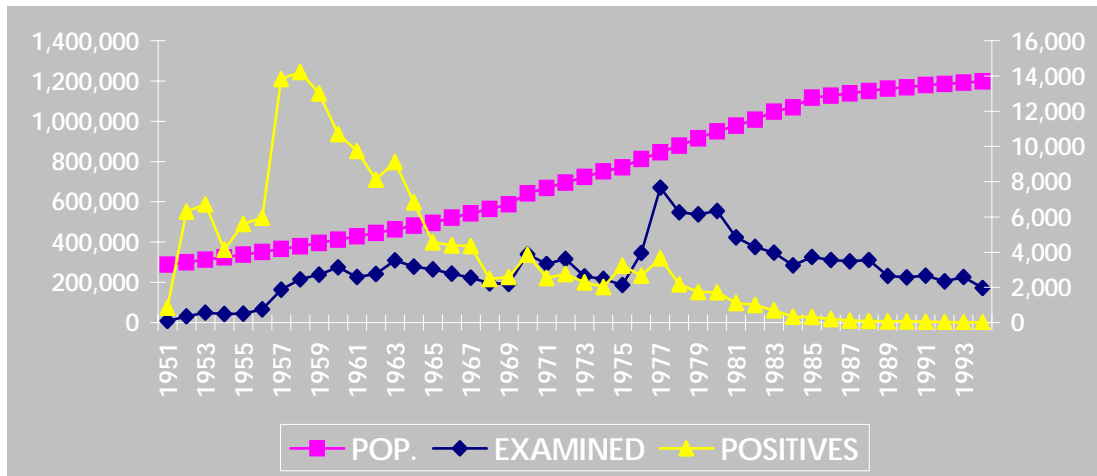


Urban area: 242,812 km²
 Rural area: 263,676 km²
 Total area: 506,488 km²

Urban population: 1,273,018
 Rural population: 8,261
 Total population: 1,281,279

CODEM (Municipal Development Committee; *Comité de Desarrollo Municipal*),
 IBGE 2000

Figure 2. City of Belém (1951–1994): Evolution of the number of mf+ patients



National Health Foundation (*Fundação Nacional da Saúde*; FUNASA)

By 1955, surveys were divided into six different areas, the morbidity population had disappeared, and just six cases (0.8%) were detected out of 26,000 people (68% of the population). Related institutions were developed, such as the National Service of Malaria, which became the National Department of Agriculture and Public Health (*Supervision de Campaign y Saúde Pública*; SUCAM), and FUNASA. The City

Department of Health eventually assumed operational control of the LF program. Hemoscopic surveys were conducted continuously from 1951 through 1994 (see Table 1), along with identification of the sources of infection and the problem areas, intensification of surveys in these areas, treatment for all mf-positive cases, and verification of a cure through subsequent examinations.

Table 1. Results of hemoscopic surveys for detection of mf+ patients (City of Belém, 1951–1994)

Year	Population	Nº. Examined	% Examined	Nº. Positives	% Positives
1951	288,519	8,588	2.98	845	9.84
1952	300,060	31,625	10.54	6,306	19.94
1958	379,671	215,579	56.78	14,231	6.60
1968	564,082	195,175	34.60	2,471	1.27
1977	845,504	670,174	79.26	3,657	0.55
1978	879,324	547,781	62.30	2,184	0.40
1988	1,150,411	310,858	27.02	90	0.029
1994	1,197,300	172,174	14.38	13	0.007

FUNASA. Surveys were carried out each year from 1951–1994. Figures marked in red indicate the end of each decade. Figures marked in blue indicate special situations (the beginning of the survey, a higher index of positivity, a greater number of absolute cases, a larger examination index, or the most recent study by endemic historical city sector).

Table 2. LF control program (1995–2001): Hemoscopic survey

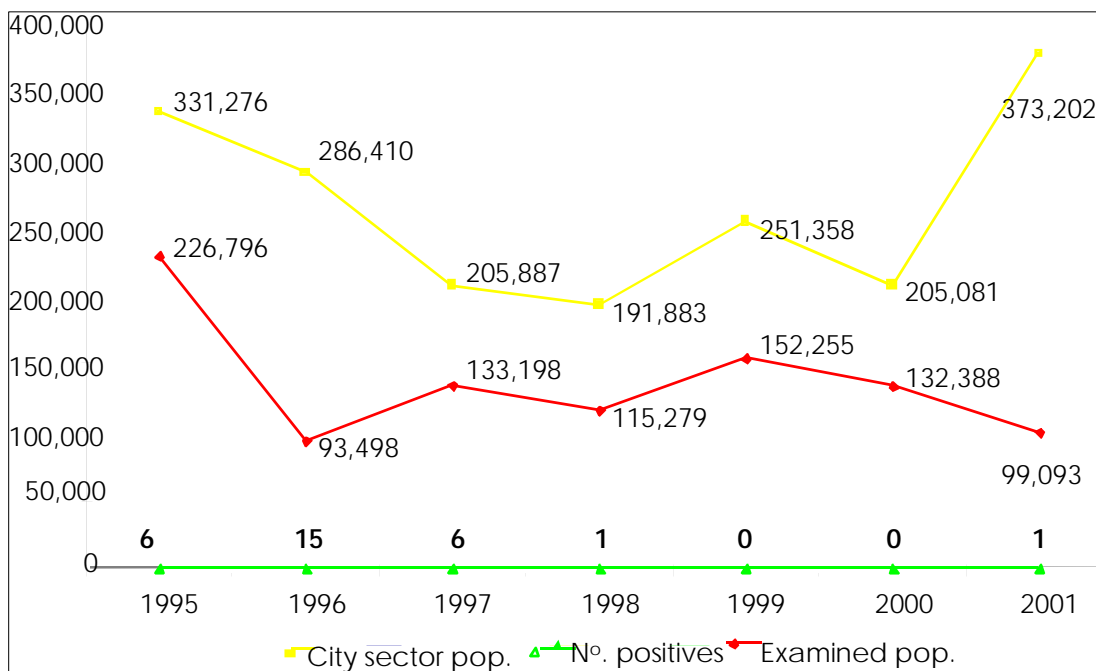
Year	Nº. of city sectors analyzed*	Population of city sectors analyzed	Nº. of individuals examined	% of individuals examined	No. of individual microfilareemics	% of individual microfilareemics
1995	6	331,276	226,796	68.5	6	0.002
1996	5	286,410	93,498	32.6	15	0.016
1997	4	205,887	133,198	64.7	6	0.004
1998	5	191,883	115,279	60.1	1	0.0009
1999	7	251,358	152,255	60.6	–	–
2000	6	205,081	132,388	64.6	–	–
2001	15	373,202	99,093	26.6	1	0.001

FUNASA / DCE-Department of Health Monitoring (*Departamento de Vigilância em Saúde; DEVS*)–Metropolitan Environmental Health Service (*Servicio de Salud Metropolitano del Ambiente; SESMA*)
 * Some city sectors were analyzed more than once in certain years.

The Elimination Plan of 1998 was put into place by 2001, and by late 2001, no mf had been detected among more than 99,000 persons examined over two-year period. One mf-positive case was found (see Table 2), but an epidemiological survey revealed that the person had only lived in the area for 8 months and that their area of origin was a traditionally endemic area (with mf-positive

cases 10 years prior), where the transmission most likely took place. An entomological study was also done in the survey area and no cases were found. Thick blood smear tests in 24 areas (with six covered twice) revealed two positive cases out of 499,000 people. Figure 3 shows the areas, population examined, population of the examined areas, and number of positive cases.

Figure 3. LF control program (1995–2001): Hemoscopic survey



1998–2001 (previous to elimination plan)

- Hemoscopic survey (thick blood smear)
 - 24 city sectors (6 surveyed twice)
 - 499,015 exams: only 2 mf-positive

2002 to present

- Determinative factors include
 - comprehensive and continuous hemoscopic surveys
 - identification of infection sources and problem areas
 - intensification of surveys in these areas
 - treatment provided for mf-positive patients in 100% of cases
 - verification of cure via subsequent examinations (follow-up).



The program in Belém was only a program of control until 2001. In 2002 the strategy changed, with sectors

separated into quarters and critical areas, and hemoscopic and entomological surveys implemented, followed by antigenemic surveys in children and adult males 20–30 years old. The current concern is to measure the current status and to determine how to confirm if the focal point has been eliminated and how to maintain those results. There is also the challenge of defining the strategy, and of establishing epidemiological monitoring. Inside this challenge is what to do in relation to the epidemiological components of the structure of LF, the susceptible population, vector control, and environmental management.

Vector control

Until 1956, vector control was attempted for the *Culex quinquefasciatus* (Cq) mosquito, but this was later abandoned, as it was impracticable for some reason. During this era many areas endemic for LF also had malaria. The main problem in malaria control at that time was control of the vector. Eventual economic improvement enabled the

population to improve their own living conditions, which contributed to the reduction of the vector (Cq). State-run environmental management to strengthen vector control was only initiated in the City of Belém in 1997 (when the mf index had already dropped to 0.04%). More recently, with the support of the Inter-American Development Bank (IADB), environmental management projects have been carried out in formerly endemic areas (see Figures 4–6). Project activities included the draining of canals, the recovery of degraded areas, and the relocation of the local population from marshy areas. These projects covered 12 city sectors and reached more than 500,000 people. Figure 6 shows the Basin of Tucunduba before and after a canal-draining project. This area previously had a high prevalence of LF that was later abandoned (the population was relocated).

A workshop was held with the participation of colleagues from the Aggeu Magalhães Research Center (*Centro de Pesquisas Aggeu Magalhães*; CPqAM) of the University of Alagoas (*Universidade Federal de Alagoas*; UFAL), where it was suggested that a monitoring system be established. It was also recommended that the entomological evaluation for the polymerase chain reaction (PCR) areas be defined, as well as possible individual research of the infected by more sensitive diagnostic methods, and morbidity control for sequel cases. In 2002, a study was carried out by technicians from the Secretariat of Health, with technical assistance from PAHO through the UFAL by Professor Gilbert Fontes, Eliana Rocha, and researchers at the National LF Reference Center of the CPqAM, which formed the partnership.

September 2002–2005

- 246,856 exams: 100% negative
- Entomologic survey (2002–2004)
 - 66 city sectors/localities (12,386 households)
 - 88,507 Cq; 28,933 dissected; 36,395 verified with PCR (100% negative)
- Antigenemic survey
 - 20,732 Cq; 9,800 verified with PCR (100% negative)

Figures 4–5. Environmental sanitation projects in formerly endemic area



Figure 6. Canal-draining project: Tucunduba Basin



The hemoscopic surveys of 2002 through September 2005 (see Table 3) included examination of thick blood smears (246,856), and all were negative. In the entomological study (see Table 4), 66 areas were surveyed, including 12,386 houses. A total of 88,507 mosquitoes were captured; 28,933 were dissected and 36,395 were verified by PCR. All were negative. Hemoscopic surveys were still considered necessary, however, in previously critical areas with sanitation conditions conducive to the transmission of LF. In 2002, 44 areas were surveyed, with the population examined, and in 2003 until this year, studies were continued in some areas, until September, when more than 25,000 corresponding examinations had been carried out. No mf-positive cases were detected in the more critical areas of transmission.

Table 3. LF Elimination Plan—Hemoscopic survey: Belém (2002–2005)

Year	N° of city sectors analyzed	Pop. of city sectors analyzed	No. of individuals examined	% of individuals examined	No. of mf-positive individuals	% of mf-positive individuals
2002	44	547,412	92,463	16.9	–	–
2003	12	339,253	73,895	22.0	–	–
2004	5	301,342	55,270	18.3	–	–
2005*	9	125,001	25,730	20.6	–	–

DCE-DEVS-SESMA; * January–September

Table 4. Entomologic survey—Areas of hemoscopic survey (dissection): Belém (2002–2004)

Year	N° of city sectors/areas	N° of houses	N° of female mosquitoes captured	N° of female mosquitoes dissected	N° of female mosquitoes infected
2002	29	2,694	23,460	11,454	–
2003	21	4,065	25,467	13,009	–
2004	16	5,627	39,580	4,470	–
TOTAL	66	12,386	88,507	28,933	–

DCE-DEVS-SESMA

Table 5. Entomologic survey: Areas of hemoscopic survey (PCR): Belém

Year	Nº of city sectors/areas	Nº of houses	Nº of mosquitoes captured	Nº of mosquitoes verified with PCR: CCBi/UFAL	Nº of mosquitoes verified with PCR: IEC	Nº of infected mosquitoes
2002/2004	66	12,386	88,507	31,000	5,395	–

DCE-DEVS-SESMA / Center for Biological Sciences (*Centro de Ciências Biológicas*; CCBi), UFAL- Evandro Chagas Institute (*Instituto Evandro Chagas*; IEC)

Antigenemic surveys

As per World Health Organization (WHO) guidelines for elimination, antigenemic research was conducted in schools in traditionally prevalent areas. Testing with immunochromatographic test (ICT) cards (see Figure 7) was conducted in 2003 among students from four age groups (6, 7, 8, 9, and 10 years old); 3,000 cards were evaluated and all results were negative (see Tables 5–6 and Figures 8–10).

ICT card tests

- Patients in morbidity care (26): 100% negative
- Morbidity survey for evaluation of transmission in adults (November/December 2004) (19): 100% negative
- Microfilaremic (as per hemoscopic exam) treated in the last 10 years with follow-up hemoscopic exam: 100% negative

ICT was conducted to evaluate the current transmission of *W. bancrofti* in the City of Belém among 3,000 schoolchildren 6–10 years old in historically critical areas. The chosen testing areas were those with historically high prevalence of microfilaremic city sectors where the most recent cases had been detected.

Figure 7. ICT cards: Positive and negative samples

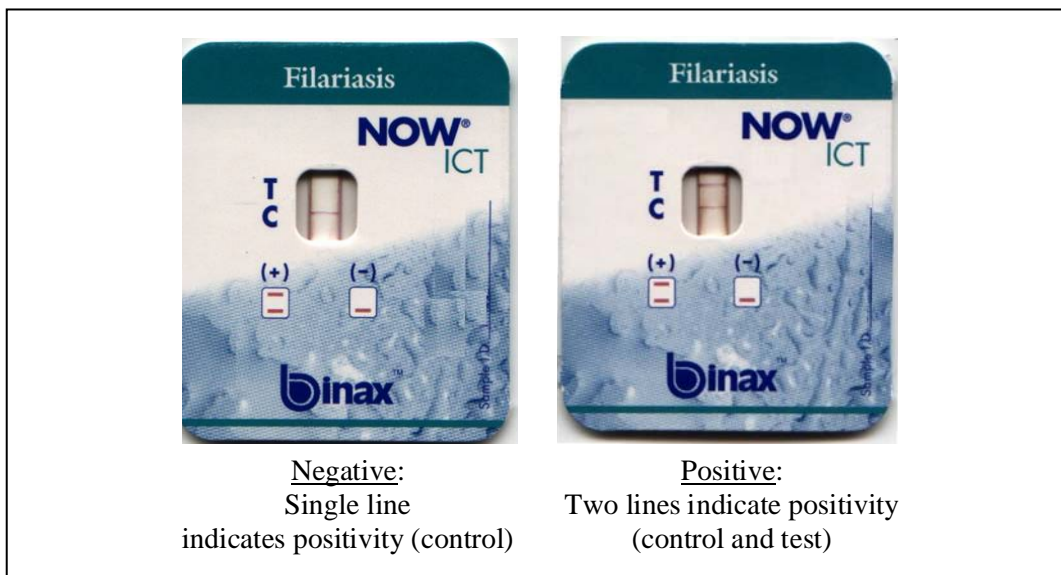


Figure 9. ICT card surveys conducted by the Program to Eliminate Lymphatic Filariasis (PELF) among schoolchildren 6–10 years

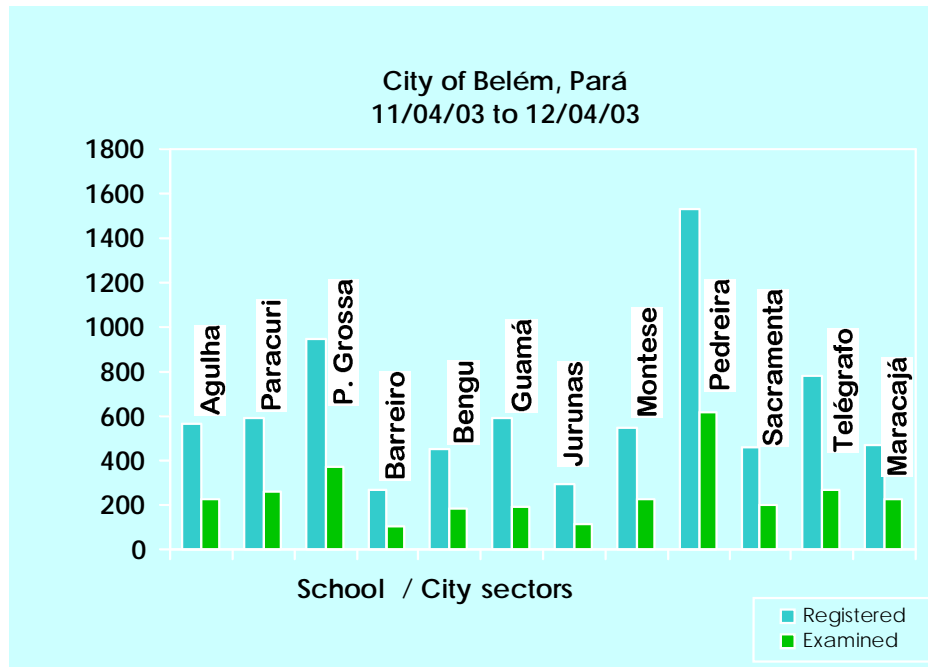
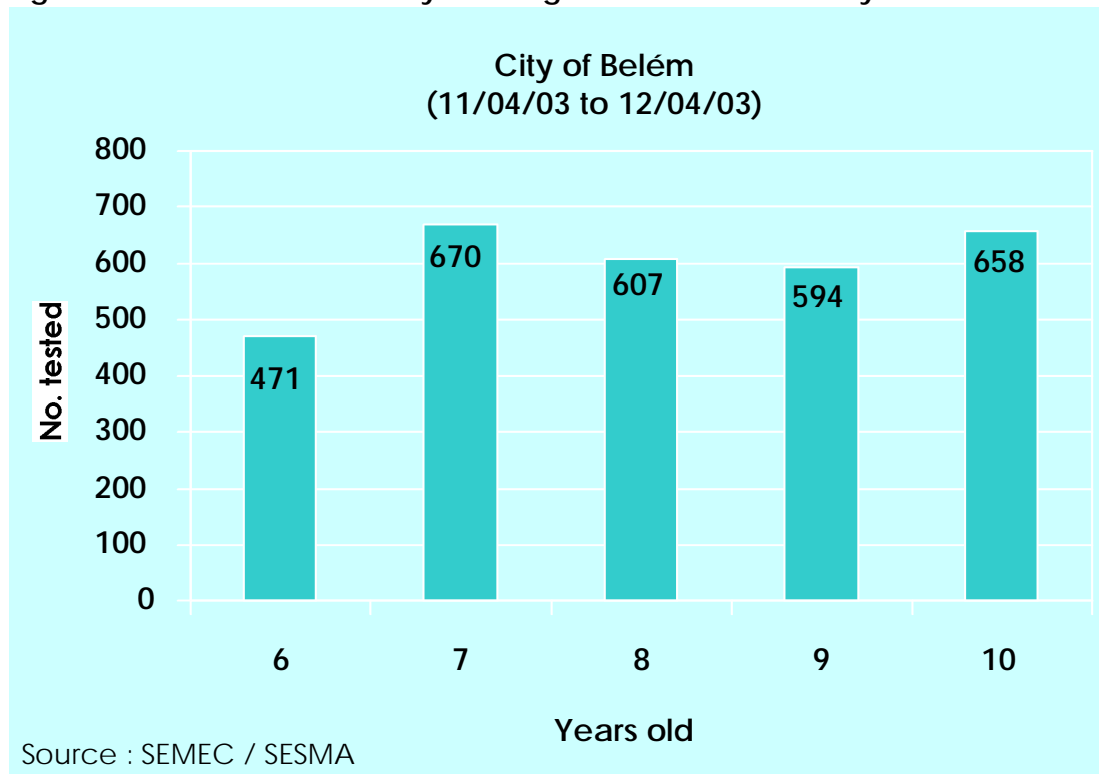


Table 6. CT card surveys conducted by the PELF among schoolchildren 6–10 years in the City of Belém (11/04/03–12/04/03)

Area/city sectors	Nº of existing schools	Nº of searched schools	Nº of registered students (6–10 years)	Nº of searched students (6–10 years)
Icoaraci:				
Agulha	1	1	566	223
Paracuri	1	1	590	261
Ponta Grossa	1	1	952	377
Belém:				
Barreiro	1	1	270	108
Bengui	4	1	450	185
Guamá	4	1	594	190
Jurunas	2	1	300	117
Montese	3	1	552	225
Pedreira	4	3	1,533	620
Sacramento	1	1	465	197
Telégrafo	2	2	785	272
Mosqueiro:				
Maracajá	1	1	470	225
TOTAL	25	15 (60%)	7,527	3,000 (39.85%)

Municipal Department of Education (*Departamento Municipal de Educación*; SEMEC) / SESMA

Figure 10. PELF ICT card surveys among schoolchildren 6–10 years



Morbidity survey



Using the adult ICT cards, 26 patients were followed up with a morbidity survey (including 19 identified in the antigenemic survey), and 9 cases of possible disease symptoms were identified. During this period, 59 patients were evaluated; of those only 2, based on the epidemiological survey, had symptoms suggestive of possible recurrence of LF. Confirmation was never completed as both

patients died of renal failure. Of the other pathologies identified, the majority were erisipela and unknown causes (hematosis, x-ray treatments, etc.).

Serologic surveys

- Verification of the absence of infection for *W. bancrofti* in areas considered under control using serologic survey
- Use of the ICT card test to evaluate current transmission of *W. bancrofti* in the City of Belém among male adults (20–30 years) in areas previously selected by environmental and epidemiological criteria

New work elaborated by the CPqAM team with the collaboration of the City Department of Health was applied in areas considered to be under control using serologic surveys (see Figures 11–12 and Tables 7–8). ICT cards were used in the evaluation of transmission in the City of Belém among adult males in eight previously selected areas comprising 70 high-risk sectors based on environmental and ecological criteria (all were endemic in the past, and one had high prevalence).

Figures 11–12. Serologic surveys conducted in the City of Belém



Table 7. PELF ICT card survey among males 20–30 years: City of Belém (09/22/04–11/12/04)

City sectors	N°	Selection criteria	ICV * type
Icoaraci:			
Agulha	6	Environmental + Epidemiologist	High
Campina of Icoaraci	10	Environmental + Epidemiologist	High
Ponta Grossa	4	Environmental + Epidemiologist	High
Belém:			
Guamá	11	Environmental + Epidemiologist	High
Jurunas	9	Environmental + Epidemiologist	High
Montese	10	Environmental + Epidemiologist	High
Pedreira	10	Epidemiologist	High / Middle
Tapanã	10	Environmental	High
TOTAL	70	–	–

SESMA; * ICV (Life Conditions Index)

Sectors were categorized as Priority 1, 2, or 3 in terms of risk of LF transmission. A total of 2,171 households were visited and 2,816 people were examined; all were negative. In the same areas an entomological survey was also done (see Table 9 and Figure 13). A total of 20,732 mosquitoes were collected (17,073 ingurgited and 3,659 non-ingurgited), as shown in Table 9. PCR testing is not yet completed, but [as of October 2005], 9,800 mosquito samples had been tested and none were positive.

Figure 13. Entomological survey site



Table 8. Evaluation of LF transmission using ICT cards among men 20–30 years (09/22/04–11/12/04)

Nº order	City sectors	Sectors	Priority 1 *	Priority 2 **	Nº. of households visited	Nº. of males examined	Nº. of male positives
01	Ponta Grossa	4	4	–	139	165	–
02	Campina of Icoaraci	10	10	–	328	414	–
03	Agulha	6	6	–	156	195	–
04	Tapanã	10	10	–	190	227	–
05	Pedreira	10	7	3	309	417	–
06	Montese (Terra Firme)	10	10	–	318	441	–
07	Guamá	11	11	–	405	517	–
08	Jurunas	9	9	–	326	440	–
TOTAL		70	67	3	2,171	2,816	–

DCE-DEVS-SESMA; * High-risk areas; ** Average-risk areas

Table 9. Entomologic survey areas of antigenemic survey (ICT card): PCR

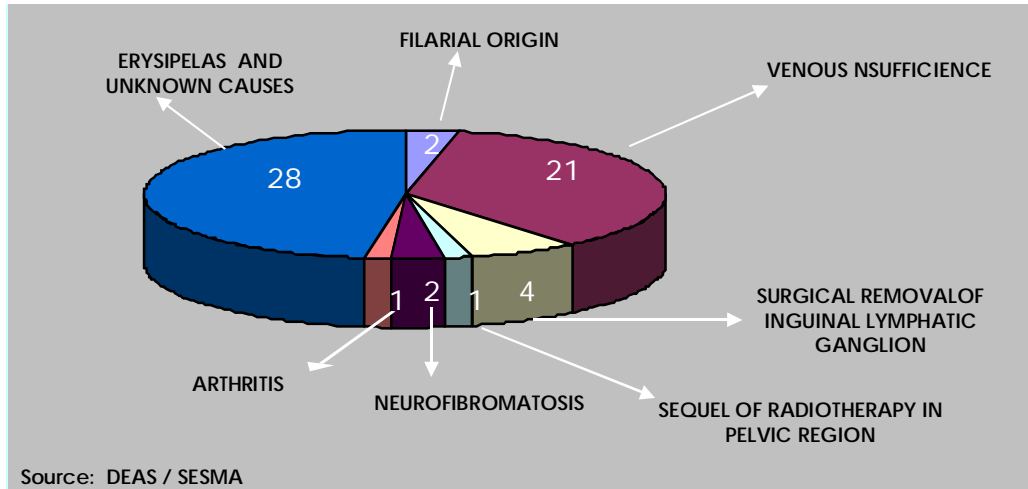
District	N° of city sectors	N° of houses	No. of captured mosquitoes (IN*)	No. of captured mosquitoes (Ni**)	No. of captured mosquitoes (Total)	No. of mosquitoes verified with PCR	Positives
DAICO	3	569	5,751	1,222	6,973	3,600	–
DABEN	1	164	1,449	245	1,694	1,050	–
DASAC	1	293	2,461	596	3,057	1,200	–
DAGUA	3	901	7,412	1,596	9,008	3,950	–
TOTAL	8	1,927	17,073	3,659	20,732	9,800	–

*IN, ingurgited; **NI, non-ingurgited

Summary

- Hemoscopic survey (2002–September 2005)
 - 246,856 exams
 - All negative
- Entomologic survey (2002–2004)
 - 66 city sectors/localities
 - 12,386 households surveyed
- Antigenemic survey
 - 88,507 Cq collected
 - 28,933 dissected
 - 36,395 verified with PCR
 - All negative
 - 20,732 Cq collected
 - 9,800 verified with PCR
 - All negative

Figure 14. Etiology of lymphedema (PELF / Belém, 2002–2004)



Implementation of epidemiological monitoring system

- Entomologic evaluation / PCR in areas to be defined
- Improvement of individual research of possible infected via more sensitive diagnosis method
- Control of morbidity of cases with possible sequels of LF

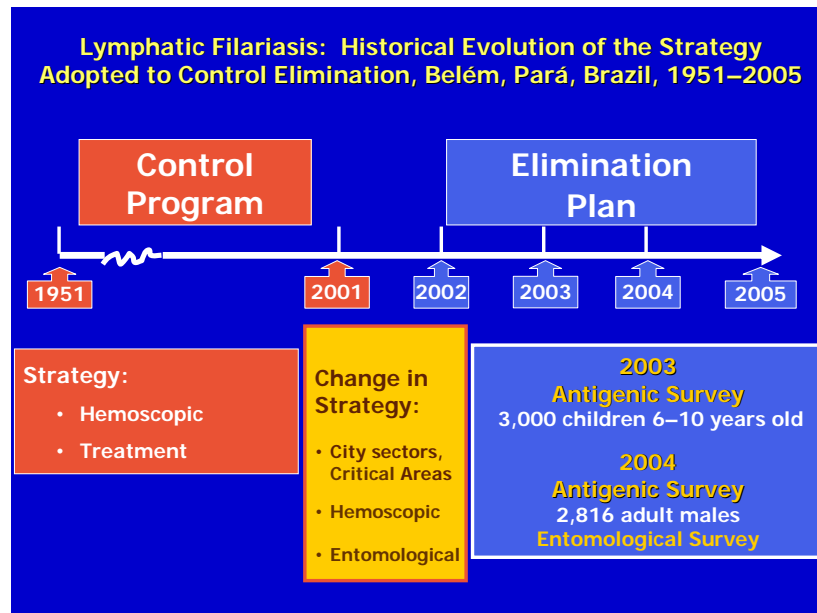


VERIFICATION OF ELIMINATION

Verification of elimination

The historical evolution of the program in Belém leading up to the current period of verification of elimination can be viewed in terms of the various strategies adopted for control and elimination from 1951 through 2005.

Figure 15. Belém control and elimination strategies (1951–2005)



Conclusions

- Indicative of interruption of transmission LF (WHO values of prevalence $\leq 0.1\%$)
- Results do not definitively exclude the possibility of transmission in all areas due to the historical profile of distribution of the disease
- New similar survey associates to other diagnostic methods are being effected

According to the WHO guidelines, mf prevalence equal to or less than 0.01% is indicative of elimination of transmission. Upon interpreting the survey results, the one case of transmission was excluded, because it had been definitively attributed to the

distribution of LF in Belém, which was present in the determined areas, as in the case of Maceió, and the distribution was very sparse. These results suggested that new surveys or other methods of similar diagnosis be carried out, along with similar surveys.

Challenges

- What to do in relation with the components of epidemiologic structure of LF?
 - Susceptible population
 - Vector
 - Environment

DISCUSSION

Comment. The amount of work that's been done is overwhelming. There are probably areas of Atlanta, New York, and Houston that have higher mf prevalence than Belém.

Comment. The success of the work raises the question, at least in the future, for the need to look at how much more work is needed. Perhaps you might be planning more work than is necessary.

Comment. The criteria still to be developed to confirm the elimination of transmission, so they are going to need at least some additional work for surveillance.

Question. When the patients were treated, were they followed up for 12 days?

Response. Yes, in principle—when the program was initiated, at the beginning of the program treatment. It was later verified whether or not patients had been given a complete treatment.

Comment. A strong treatment program is very important. In Belém, the determining factors were the use of mass drug administration (MDA) plus the examination, and the great coverage of the examinations—their intensity in relation to the population. There was only one mass treatment, but this was accompanied by examinations for case identification followed by intense treatment, which seems to be the key.