The eradication of malaria in Mauritius during the Second World War

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Introduction

One of the many problems that colonial governments faced in administering the colonies was the control of diseases. In the eighteenth and nineteenth century, French and British colonial administration in Mauritius had to confront a number of epidemics such as cholera, small pox and malaria. In 1867-1868, a malaria epidemic killed about 40,000 people in a population of 333,000 in the island.Throughout the last decades of the nineteenth century and first half of twentieth century, malaria remained a major cause of mortality and morbidity in the island, and it prompted a number of anti-malarial schemes in the island. Several malariologists and sanitarians including Osbert Chadwick, Robert Ross, Andrew Balfour and Malcolm MacGregor were brought to investigate the disease, and a result of their reports and recommendations, a certain amount of money was spent on anti-malarial works.These works were not properly maintained for lack funds except in the districts of Moka and Plaine–Wilhems where most of the colonial elite resided. It was only during the Second World War that fresh measures were systematically employed and vigorously implemented and together with the use of D.D.T, and collaboration at various levels imperial government, local administration, the medical authorities and the population, malaria was eventually eradicated within a decade.

This paper will investigate wartime measures in dealing with malaria in Mauritius and examine the relationship between colonial medicine and imperialism in the Mauritian context. Colonial medicine has been viewed as a tool of empire, imposed from above in the political and economic interests of the colonial powers even when it was extended to the general population

while the economic and social conditions of the population were ignored[319]. This general thesis remains valid but there were also positive results for the indigenous population in a few cases[320]. In Mauritius, during the Second World War, imperialistic goals did not change in tackling malaria, but certain shifts in policies and motivation in response to the local context proved beneficial to the population. Health measures proved one successful area of colonial welfare during the war and after, and similar measures initiated by the colonial administration in the field of education and social services enabled the colonial elite after the war to build an embryonic welfare state.

From the 1880s, medical experts, sanitarians and malariologists were brought to the island to tackle the problems of sanitation that were the main factors responsible for the outbreak of diseases. Their efforts proved unsuccessful. Conflict within the ranks of the elite regarding certain measures, lack of funds to sustain anti-malarial schemes and the indifference of the colonial elite to the general health of the population and inadequate knowledge about the disease were some of the factors impeding the implementation of health measures in the colony. For example, it was argued that a drainage scheme for the town of Port-Louis would worsen the health situation. This debate among the elite between those for and against drainage became a major political issue and it was not until 1893 that a sewage system was installed in Port-Louis on the recommendations of Osbert Chadwick. Other measures proved more acceptable to the elite. One example is the construction of filtration plants for water from the Mare-aux-Vacoas reservoir to improve domestic water to the main towns. In 1908, the colonial elite invited the Ronald Ross to the island because the Plaines Wilhems district, which was the residential area of the elite that had been relatively safe from malaria in the past was being affected too. Ross made his enquiry and wrote his report for the prevention of malaria in Mauritius. Anti-malaria works were started and produced good results but were later not properly maintained because of lack of funds. There were other experts who recommended fresh schemes for sanitation and the draining of marshy areas and these were started in Plaine Wilhems and Moka but were not extended to the remaining coastal districts. One other reason besides finance which impeded the spread of anti-malarial works throughout the island, particularly in the coastal areas was the fear that was frequently expressed that the abolition of breeding grounds for mosquitoes near the coast would drive the mosquitoes in the up-country districts inhabited by the elite[321].

Reviewing the situation in the 1940s, E.R. Harrison of the Ross institute found that had the Ross report been followed, there would have been

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[319] *Imperial medicine and Indigenous societies*, David Arnold éd. Manchester, Manchester University Press, 1988.

[320] Jones Margaret, « The Ceylon Malaria Epidemic of 1934-35: A case Study in colonial medicine », in *Social history of Medicine*, Vol.13 (1), p. 87-109.

[321] Sippe G and Twining M., *Survey and field treatment of malaria in Mauritius. Colony of Mauritius*, 1946, p. 1.

no malaria in the country. Moreover, he found that the advice tended in other reports by Andrew Balfour and Malcolm Mac Gregor had been ignored. He also found that knowledge about malaria existed in the country and medical officers persevered in their work despite the shortage of funds, lack of staff and indifference. There was a malaria field laboratory under Colonel Bryant which was highly skilled and efficient, but Harrison reached the conclusion that failure had been due to lack of continuity of effort and fate[322]. Harrison's assessment was in line with what Governor Hesketh Bell had observed - that the suspension by government of the programme of sanitary works recommended by Dr A. Balfour must be responsible to a great extent of the deaths caused by malaria.

In the late 1890s and early 20th century, colonial policy was changing. There was the growing self-confidence of western medicine to tackle the problem of disease and medical intervention became central to the development of the colonial state and often to the colonial economy itself[323]. It was also realised that colonial medicine had not benefited the population and by the 1920's there was the growing idea that much ill h ealth was intractably bound with problems of poverty and malnutrition[324]. In 1919, the island suffered from the Spanish influenza and the death toll was about 8,000. In 1920, Andrew Balfour published his health report on Mauritius and a number of reforms were implemented. The Health Department was reorganized and sanitary conditions in the island improved particularly in Port Louis[325].

With the onset of the Great Depression of 1929, economic and social conditions deteriorated in the island. The economic crisis had major impact on the island with the drastic fall of sugar prices, resulting in unemployment and an increase in mortality and morbidity as the colonial government made matters worse by pursuing a policy of retrenchment. Mortality rate in some districts was 60 per mille and deaths annually exceeded births by thousands largely on account of poverty and malnutrition[326]. Health and sanitation of the colony was a major preoccupation of the Governor Sir Hesketh Bell, the unofficial members of the Council of Government and Dr Kirk, Director of Medical and Health Department. The latter had proposed a number of health reforms, but these were always subject to financial considerations, as it was feared that 'it might throw an intolerable burden on the British tax-payer'[327]. Though the Governor acknowledged the immense difficulties in matters of

[322] Harrison E. R « Control of Malaria in Mauritius », in *Memorandum and Notesto Director of Medical and Health Department*, Mauritius 1st October 1943.
[323] *Imperial medicine and Indigenous societies*, David Arnold éd., *op. cit.*, p. 18.
[324] *Imperial medicine and Indigenous societies*, David Arnold éd., *op. cit.*, p. 21.
[325] Reddi S.J War, *Influenza and public health : A case study of the Influenza epidemic of 1919 in Mauritius.* Unpublished paper presented at the conference on the Spanish Influenza, Cape Town University.
[326] CO/167/880 /9 H. Bell to Philip Cunliffe- Lister 5th October 1932.
[327] CO/167/880/9 Minute by H.R Cowell 18/10/1932.

finance, he also pleaded that 'the health and lives of people are matters of prime consideration'[328].

One of the major consequences of the depression was the labour unrest which engulfed the island in the month of August 1937. A Commission of Inquiry was chaired by the Procureur-Advocate General, Charles Arthur Hooper came with a blue print to address many of the problems resulting from the depression. In the West Indies, similar economic and social unrest has resulted in the Moyne Commission in 1939 and a change in imperial policy with the setting of the Colonial and Development Welfare Fund (CDWF) in 1940. After the economic and political crisis in Mauritius, a new Governor, Bede Clifford was sent to Mauritius in 1937 to deal with the situation but also to prepare the country in anticipation of war. He sought to establish and restore colonial control and authority through a number of measures by introducing trade union legislation, appointing representatives of the small planter class in the Council of Government and by commissioning two major reports, one on education by Ward and another one on health by Dr A. Rankine. The governor argued that the most harmful diseases were inter-related and advocated measures for sanitation, the control of flies and mosquitoes, and the prevention of soil pollution as the best line of preventive action for all. However, his recommendations to the Colonial Office were considered too vague for any action to be taken. One official commenting on the Governor's programme remarked that financial assistance from the Colonial Development and Welfare vote was not made 'on general statements of policy but on detailed schemes, full consideration from every aspect, supported by professional advice where necessary and accompanied by estimates'[329]. Although the Colonial Development and Welfare Act 1940 proposed a new policy for colonial development, the outbreak of war in 1939 brought a change in the direction of the island's affairs and no progress was registered under the new policy as there followed 'a curtailment of existing social and other services'[330]. There was no prospect of improving the sanitary conditions in the island with regard to malaria.

In 1940, the Medical and Health Department continued its business as usual with some anti-malaria works in the district of Plaines Wilhems. A small anti-malarial department had been operating under major Jepson and later by Major Bryant who took over in June 1943. Anti-malarial work was patchy and ineffective. MacGregor had confined his works only to the district of Plaines Wilhems. Later Harrison identified a n umber of weaknesses. Although essential anti-malaria works had been done, oiling was not properly understood, flushing had not been heard of and the value of shade to control breeding was neglected and was a new idea[331]. In 1940, the annual report of the Medical and Health department considered that public health in the

[328] CO/167/880 /9 H Bell to Philip Cunliffe -Lister 5th October 1932.
[329] CO167/919/24 Minutes by Luke 9/1/42, Acheson 7/2/42.
[330] Debates No6 of the Council of government, Mauritius 11th June 1940.
[331] CO167/929/3 Donald –Mackenzie Kennedy to Oliver Stanley S.S 24th.
July 1944.Malarial Control Scheme.

colony was good as there was no major epidemics[332] .Yet the number of in-patients for malaria was 3,828. In 1941, the numbers of admissions climbed up to 4, 555 and outpatients were 54, 346[333]. The expenditure of the department was Rs1, 576, 531 out of a revenue of Rs19, 383,000 in 1940 and in 1941, Rs1, 593,066.69 in a revenue of Rs 22,238,456.89[334]. In 1942, the situation regarding malaria had even worsened There were 5,014 in-patients and the number of outpatients was 53, 969.

Rankine's report on health was published in 1944. He endorsed the new approach to colonial medicine. Although the economic aspects of health were highlighted, his recommendations went beyond the economic and political interests of the colonial government. He propounded a long-term strategy and linked the control of diseases with the social environment. He advocated a number of social amenities such as housing, sanitation, water supplies, maternity services, infant welfare, school medical services and health education. Rankine took a h olistic and participatory approach and viewed health from various fronts. He had also consulted senior officers of the department, a number of individuals, both on a personal and official levels and he had been told by the Governor not to allow financial considerations to affect his recommendations. More importantly Rankine made it clear that *'if we are to do anything good in Mauritius, we shall have to secure continuity and the only way to secure that…is to produce results for the initial efforts and to secure the cooperation of the public by a policy of tactful and personnel education*'[335]. At the Colonial office, Rankine report met with the approval of Watson who considered it 'a good report'. Yet the report could not be implemented with the outbreak of war for lack of materials and resources. On the other hand, conditions in the island worsened because of the shortage of food, particularly rice which was the staple food of the population, and food dearth led to severe problems of malnutrition and increasing morbidity of the population.

In 1942, the war forced a new approach to the problem of malaria. Change in the war situation in Asia made it necessary to post British troops in Mauritius as Mauritius regained importance because of its strategic location. The presence of considerable forces of His Majesty in the island made it necessary to protect certain areas from malaria[336]. Troops and labour gangs had to be posted in coastal areas and strategic locations such as Mahebourg, Plaisance, Port-Louis and Baie du Tombeau, which suffered from a high incidence of malaria[337]. In anticipation of the coming of His Majesty's troops, in 1941, a military malaria unit was formed to 'control malaria in

[332] *Annual Report of Medical and Health Department*,1940, p. 1 ;1941, p. 9 (hereafter cited as Annual Report).
[333] *Annual Report* 1940, p1 ;1941, p.9.
[334] *Annual Report*,1940, p1 ;1941, p.9.
[335] CO167/928/10 Dr Rankine to Dr Kauntze Medical Advisor to the Colonial Office 14th November 1945.
[336] Gorvin Report 1947 *Health and Welfare* p. 7.
[337] Sippe G and Twining M, *Survey and field treatment of malaria in Mauritius, op. cit.*

certain areas'[338]. An organisation was set up and funds obtained from the Imperial government through the colonial Development and Welfare fund led to a spate of measures to tackle malaria in these regions. Since a number of villages near the military areas were rife with malaria the health of the military would be affected. As there were no alternative sites for the military, malaria in the nearby villages had to be controlled. Inevitably people in these areas also benefited but that was not the primary purpose of the anti-malaria schemes.

During the period 1942-1943, as part of an anti-malaria experiment, Dr Anne Sippe and Twining undertook therapy and feeding on an experimental basis under the supervision of Dr Rankine, the Director of Health[339]. The coastal areas were mapped and surveyed, children from the age of 2 to 10 and 11 to 20 were screened as well as laboratory work was also done[340]. Tables of splenic and parasites indices for towns and villages and an efficient anti-malarial works were carried out and completed between 1942-1943[341]. Field work carried out in the nearby villages for the protection of the military targeted children in the age group 0-10 as it was this age group found to be most likely to be infective of mosquitoes. Children between 1-10 years, the main carrier group were treated by a combination of drug therapy and or extra feeding[342]. Feeding and a drug therapy included quinine, and later when the use of quinine was restricted, Atebrine –Mepacrine and Islatebrin-Plasmoquin were used. Treatment centres were set up in schools, shops, estate hospitals where children attended as required. Those who failed to attend were visited and dosed in their homes. This was rigorously enforced as the treatment assistant had to account for every child on his register and 90% of each group was treated in this way whenever the treatment was undertaken[343]. Milk and shark liver oil fed also fed to children as macrocytic was also linked.

Between 1942 and 1944, the Military Malarial Unit undertook the canalisation of rivers, streams, the draining of marshes, routine maintenance of works in the military areas of Port-Louis, Plaisance airfield and Tombeau Bay. Anti-malarial works were started by the Admiralty in Beau Bassin and in the detainment camp for Jewish refugees. Vector-control measures that had been advocated by Ronald Ross and others were revived and stepped up. They consisted mainly of draining, filling, clearing and oiling of actual and potential breeding places. Already in 1942, some measures had already been taken.

Anti-malarial works proceeded by stages following a set of protocols. Following reports of the League of nations in 1933, it was also advised that before reducing malaria in a locality by a system of gametocyte

[338] *Annual Report* 1942, p.2.
[339] Dowling M.A.C, « Malaria Eradication in Mauritius », in *British Medical Bulletin,*1951 p. 72.
[340] *Sippe and Twining*, p. 2.
[341] *Sippe andTwining*, p. 70.
[342] *Sippe and Twining*, p. 70.
[343] *Sippe and Twining*, p. 54.

therapy, it was important to know exactly in what age group of the population were these forms of parasite prevalent and to concentrate efforts on these persons within these groups[344]. On the other hand surveys were carried out following a recommendation from an article in the British Medical Journal of 1942 that suggested that a survey be carried out before public funds were expended for efficient malaria control. A particular population and age-group was targeted and in the present case, people in the adjoining areas were the treated group as the number of people were kept at the minimum'[345]. It fell to the military to undertake the survey to assess the endimicity and the types of malaria in these areas.

Although the local elite had been advocating a new and comprehensive health policy as part 'of a concrete Post-War Reconstrution in Health and Social Welfare 'in July 1943[346], the arrival of E.R Harrison, in September 1943, was a major turning point in the anti-malarial campaign. Harrison had been sent to advise the government to improve malaria control for the military though it was expected that the population would benefit from these measures. Harrison had wide experience of malaria control in Malaysia and it was expected that his experience and successes there could be replicated in Mauritius. In his report to the Director of Medical and Health Department, he recommended a robust structure – the setting up of a Malaria Board chaired by the Director of the Health and Medical Department with representatives from various departments. He sought wider collaboration to improve efficiency. The board set itself a number of objectives that involve collecting information and statistics, monitoring progress, devising anti-malaria schemes, carrying propaganda work, devising new laws, reclamation of derelict areas and also considered the financial implications. He addressed all the main barriers which had impeded progress in the past and also provided technical advice to remedy what he considered weaknesses and failures, He emphasised continuity in anti-malaria works, and made recommendations on various technical issues regarding oiling, flushing, irrigation and the influence of shade[347]. He did not neglect propaganda and education and wanted to involve the whole community to combat malaria. Confident that he could eradicate malaria in Mauritius Harrison showed a determination to tackle the problem vigorously and used strong language and proposed harsh measures and several laws 'for those who put the lives of others in danger through neglect'. He carried a cost benefit analysis of his various schemes and concluded 'no country can afford to have malaria'. He prepared a memorandum on malaria control and on the 17th December 1943, the Governor inaugurated the malaria Control Committee that immediately settled down to work. A number of sub- committees were set up to draft and

[344] *Sippe andTwining*, p. 34
[345] *Sippe and Twining*, p. 33.
[346] *Council of Government Debates* (No 75) Session 1940-1943, Meeting of 8th July 1943.
[347] Harrison E. R « Control of Malaria in Mauritius », art. cit., p. 2-4.

revise malaria and forest laws, a law for the malaria Control Board and the estimates of various schemes to were £1,500,000[348].

The combination of malaria treatment and anti-malaria works succeeded in keeping protected areas for the military malaria free. People living nearby in the district of Grand –Port also befitted and a malarial survey among the people showed that spleen rates in the civil population had remained around 40 to 50% and parasites rate had fallen between 0 to 20%[349]. In 1944, Malcolm Watson praised the work of Rankine and Harrison. Both men according to Watson had proved crucial to Mauritius. Rankine report was considered a good one. As for Harrison, Watson considered that 'he was just the type of man that Mauritius required'. Although others such a MacGregor and Ross had done essential work in Mauritius, Harrison was able to convert all the knowledge acquired into an island wide organisation for the control of Malaria. Malcolm Watson felt that with Harrison's experience in Malaya where he controlled malaria (he) could control malaria anywhere[350].

In 1944, there was a risk that the anti-malaria works carried out for the benefit of the military might result in the same fate as previous schemes. But the war had resulted in other social, economic and political changes that made it possible to sustain the anti-malaria campaign. Apart from an efficient reorganisation of the Health and Medical Department and the anti-malaria campaigns, under Harrison and Rankine, finance was no longer a major constraint because the war had caused a s ubstantial increase of revenue resulting from high sugar prices. On the other hand, there was the growing realisation in the 1930s that economic and social conditions of the population were important to tackle problems of ill -health of the population for the benefit of economic development. Writing to the Secretary of State for Colonies the governor wrote on the 12th October 1944. It is of utmost importance that the main recommendations (the Rankine Report) should be made effective for they are fundamental to the development to their fullest extent the resource of the colony if the economic plane is to be raised to the level required for an adequate standard of living'[351]. This was reflected in the Colonial Development and Welfare Act of 1945 and at the local level there was a convergence of views on the relationship between health and economic development as expressed in the Ten-year Development Plan for the island. The priority of the programme was given to schemes to increase the productive capacity of the island for the benefit of the mother country. The next priority was health and implementation of the Rankine report was also was concerned with increasing the productive capacity of the island through a

[348] CO167/929/3 D.M Kennedy to Oliver Stanley S. S 24 July 1944; Malarial Control Scheme. Enclosure to Mauritius Despatch 172 0f 24/71944
[349] CO167/924/5 Malarial Control 1945
[350] CO167,929/3 Malarial Control Scheme Malcolm Watson letter to Harrison 11 September 1944.
[351] CO167/927/11 Governor to Secretary of Sate for colonies 12th August 1944.

healthy labour force. As a result, anti-malaria works were extended to the whole island.

The anti-malarial works must therefore be viewed in the wider context of colonial economic development and welfare. In 1944 the Governor set up a number of sub-committees to prepare a development plan and the Rankine report provided a vision of health development of the island and inevitably received consideration in the different committees set up onirrigation, water supplies, housing, milk and nutrition research. For the first time health was tackled on several fronts and elaborated with support of local professionals. The programme included improving the health infrastructure, training of personnel, nutrition education, feeding of school children, food fortification, continuation of sanitation works and maintenance. Health professionals both foreign and local had already initiated a number of measures in the 1930s but they were never implemented or completed because of the lack of finance.

The Development Plan provided an opportunity to finance health development in the long term. In the1943-1944 budget there was no increase in the provision of social services because 'first things must come first, and the colony's revenue must be devoted to immediate needs' and health priorities remained unchanged. In 1943 budget, a sum of Rs1, 908, 000 was allocated to health and that was a significant increase. As a result of war and high prices of sugar the revenue of the island had increased to Rs 50, 511 566 in 1947 and expenditure of Medical and health department had risen Rs 2, 211, 797 or 5.2 of the total expenditure[352]. A sum of Rs 378, 478 was available under the Development and Welfare Scheme[353]. In 1945, the Colonial Insecticide Committee was invited to tackle the malaria problem and in the plan, the government earmarked Rs 5 million to combat malaria and another Rs3 million for general health programme. There was a lot of discussion about health allocation in the ten-year plan; health received Rs6.4 million of which Rs 5 million were expected to be spent on anti-malaria works. A sum of Rs234, 000 were allocated to nutrition. Health allocation comprised of the recruitment of personnel, anti-malaria works and hospital equipment. Another Rs 5 million were allocated to hospital extensions, health centres, nursing quarters, welfare centres and dispensaries. Health ranked higher than education in the plan.

The success of anti-malarial unit in some localities during the war and of a small experiment in the use of D.D.T. offered 'a brighter prospect of control and even eradication of malaria than has up to the present thought been possible'. Harrison 's recommendations were implemented, and these strengthened and sustained the anti—malarial works already started. The combination of works maintenance, treatment of civilians with anti malarial drugs has succeeded to a marked degree in keeping several areas malaria free. At Tombeau Bay, only 3 possible infections were recorded among the hundreds of Royal Air Force (RAF) men who stayed in the camp for 18

[352] *Annual Report* 1947 p. 2.
[353] *Annual Report* 1947 p. 2.

months. The area was considered virtually malaria free and even in the neighbouring civil population, both the spleen rate and the parasite rate had been considerably reduced[354]. In several villages on the boundary of the control areas, the spleen rate and the parasite rate between 1943 and 1945 had been markedly reduced. In the town of Mahebourg the spleen rate which was over 30% in 1942 was reduced to 3.5 to 4 % in 1946. In Grand - Port,spleen rates had been reduced in the neighbourhoods of 40-50% but parasites rate had fallen between 0 to 20% as a result of these measures[355]. Figures in several villages show a reduction in the incidence of malaria.The town of Port-louis was comparatively free although cases which occurred were from persons in the outlying districts[356]. Malarial works carried out in Grand Port district, Bigara and Cannoniers. Point for the protection of the service personnel were considered of little value to the colony because of the scanty population in these areas[357].

In spite of the progress registered through drainage of streams and swampy areas, it was the introduction of DDT which marked a breakthrough in the fight against malaria, particularly with the arrival of E.R. Harrison. Before his visit to Mauritius, he had explored all he could about DDT at the London School of Tropical Medicine and found it to be a new weapon in the fight against Malaria. He found the use of insecticide had great possibilities in the future although he also feared that people might 'put off old and tried practices in the hope of miracles from the philosophers stone'[358]. It was only in 1946 that the army initiated an experiment in D.D.T**.** The experiment was started in the military areas and the results were impressive. It was found that from the first time of spraying to the second praying, the difference was marked and spectacular. Only 17 mosquitoes were caught as compared to 1,094 in the control huts. In 20 rooms which were sprayed with D.D.T. only 17 mosquitoes were caught compared with 84 in the unsprayed huts[359].

Encouraged by the success of the experiments with D.D.T., in May a scheme for a large-scale experiment of D.D.T. was submitted to the Director of the Medical and Health Department, Dr A. Rankine in an area of 16 square miles, an area which was hyper endemic with malaria, with typical coastal communities and relatively isolated from the large communities[360]. The strategy adopted was vector control and environmental. Government extended it to other areas and voted funds for expanding the spraying the

[354] CO167/924/5 Malarial control 1945.
[355] CO/167/929/5 Mauritiuss Malarial Control 1946.Governor Kennedy to Rt Hon George Henry Hall 31 August 1945.
[356] Gorvin Report p. 7.
[357] CO/167/929/5 Malarial Control 1946.Governor Kennedy to Rt Hon George Henry Hall 31 August 1945.
[358] CO167/929/3 Harrison to Governor 11 September 1944.
[359] CO167/929/5 *A small experiment in the use of D.D.T. in Mauritius* by H.D Tonkin, R. Lavoipierre and C. Courtois. Port-Louis, 1946.
[360] Tonking H. D. and Gebert S., *The use of D.D.T. Residual sprays in the Control of Malaria over an area of 16 square miles in Mauritius*. Medical and Health Department Mauritius, Colony of Mauritius, Government Printing,1947.

D.D.T. Following this successful experiment, spraying was recommended on a large scale and extended to the south east corner of the island. The results in the three districts of Grand-Port, Savanne and Black River were regarded as positive and though it 'was too early to many definite pronouncements on the control of malaria during the last few years. 'The mortality rate ascribed to malaria had declined from 5.87 per 1000 in 1943 to 4.12 in 1947[361]. In Black River, the residents in areas covered by D.D.T. spraying no longer suffered from malaria[362]. In brief the experiments in partial spaying had been very satisfactory[363].

Three sprayings were carried out in 1946 and completed in June 1947. The overall results 'had exceeded our original hopes of merely keeping the parasite index during the malarial season for the parasite index was lowered in the general population from 37.6 percent to 12.9 percent. In a village school of Bambous located in a malarial area, from August 1942 to June 1947, the parasite index dropped from 65.5 to 32.4 per cent and the carrier rate in school children from 30 to 3.8 percent[364]. Other corroborative evidence such as laboratory results, mosquito dissections and mosquito counts - all show that malaria control with draining ,oiling and D.D.T. could 'with a few years of coordinated effort would rid this island of malaria[365].

The use of new insecticide resulted in a new policy as this method had a powerful effect on the adult as opposed to the larva of the anopheline mosquito. The experiment on the efficacy of the new approach had to wait for some time while the major works continued. Since local experiments were giving positive results, it was decided to enlist the cooperation of the Colonial Insecticides Committee for an island -wide experiment. An energetic D.D.T. campaign was prepared and the views of Mr Symes of the Colonial Insecticide Committee had been obtained and he agreed to make available both personnel and materials for the campaign. A small team selected in U.K by the Colonial Insecticide Committee arrived in Mauritius in November 1948. A preliminary survey in 1948 shows that malaria continued unabated in the coastal areas. Several residual sprayings were carried out in the coastal areas in Grand-Port, Savanne and Black River and Flacq. The districts of Plaines Wilhems, Moka and the business area of Port-Louis were vitually free of malaria following the anti-malarial works. By 1951 the results of D.D.T. spraying were considered highly positive. The number of malaria cases dropped from 46, 395 in 1948 to 6,021 in 1950, a reduction of 87% [366]. Spleen and parasite surveys were carried out and by the end of 1951, of 17,000 children who had been examined there were only 24 cases discovered representing a parasite rate of 0.44%. In the district of Flacq, where no anti-malarial works had been carried out in the past, a survey of 2400 children between the age of 3 months and two, not a single positive case was found.

[361] Annual Report 1947, p. 13.
[362] Annual Report 1947, p 38.
[363] Annual Report 1947, p. 38.
[364] Tonking H. D., *op. cit.*, p. 7.
[365]Tonking H. D., *op. cit.*, p. 22.
[366] Dowling M.A.C *British Medical Bulletin* 1951, p 73.

Death rate and infant mortality rate declined drastically. From a mean death rate of 27.2 per thousand during the the during the period 1934-1938 to 13.9 in 1950.In 1951 Dowling concluded his paper on the progress made with use of D.D.T. 'it has been encouraging to see how rapidly house-spraying with residual insecticide on a large scale can reduce the transmission of malaria in a community when the vectors are as efficient as are A.Gambiae and A.Funestus'[367]. By 1952, the annihilation of A. Funestus,the main vector of malaria in the island was virtually destroyed though A.Gambia continued to be resistant. From 1945 to 1952, death rate fell 36.1 to 14.8 while birth rate which increased 38.3to 48.0.

The impact of the great depression and the labour unrest that followed compelled the imperial authorities to restructure and reorder Mauritian society in line with changes in imperial policy in other parts of the empire. Such policy was even more important as the outbreak of war was imminent. Later the fall of Singapore in 1942 and threats to British Empire from the east made it necessary to consolidate the strategic position of the Mauritius and the posting of British troops in the island. It was the posting of British forces in the coastal areas of the island which were rife with malaria that prompted the colonial authorities to give priority to anti-malarial works in such coastal areas and adjoining villages. This new policy was a turning point in the anti-malaria campaign. All resources human and financial were mobilised to overcome malaria first by anti-malaria works and later with the use of D.D.T. In 1949, it was reported that the anopheline which was the predominant carrier has disappeared from all dwellings in areas sprayed with DDT[368]. The positive results of anti-malaria works and the spraying of D.D.T. encouraged the authorities to extend such measures to the whole of the island so that by the 1950s it was felt that malaria had been eradicated in the island.

The successful eradication of malaria in the 1950s was the result of a chain of events of which the presence of British forces in the island and the use of D.D.T. were decisive moments. However, one should not ignore that several other factors contributed significantly to this successful health policy. It is always difficult to disentangle the importance and contribution of each factor, but all these factors contributed to sustain the anti-malaria campaign. services. There was consensus and collaboration among the colonial authorities, the local elite, colonial administrators and experts, both local professionals on health issues. A sensitisation campaign among the population through the press, the cinema, the wireless as well as the Education Department were also important for successful implementation.

During the war, the colonial government had developed closer means of communication and collaboration with the imperial government. War time conditions had resulted in a number of institutions to enlist the support of the people at various levels. Two members of the small planters

[367] *Id*., p75
[368] *Annual Report*,1949, p. 62.

were appointed to the Council of government. The setting up of a Department of Labour and the appointment of labour inspectors were intended not only to monitor and control the trade union movement but also used to conduct nutrition campaigns to deal with food shortage and other grievances. Other measures included the appointment of a n ew Director of health, the reorganisation of the Health system and the anti-malaria and sanitation campaign and a Health Development programme which in 1947 was till in an embryonic stage[369]. There were also a number of other initiatives such as new laws, nutrition campaign, school medical service, a Mal aria Advisory. Mobile units and vans conducted regular visits to the population to inform thepeople about the war but to conduct classes about nutrition and food preparation. In 1946, there was also a mobile dispensary service, a reorganisation of the laboratory services and the decentralisation of many health and sanitation.

Admittedly behind of welfare of colonial subjects were the economic factors that aimed at increasing the productivity of the labour force and on that issue the local elite, colonial and imperial administrators were all agreed. The spaying of insecticide and authoritarian practices must have been more than minor inconveniences when people had to remove or cover their furniture and other objects before spraying, or sometimes they had to replaster their interior after spraying but with time many of these inconveniences were easily overcome. As the benefits of anti-malarial measures brought concrete and positive benefits over time, local groups responded positively to the war efforts and to other measures in the field of health. At the level of the population there was generally and practically no resistance to anti-malarial works as it did not affect them negatively[370]. Sometimes during the anti malaria works there was a slowdown because of absenteeism or and other factors. In the quarter ending July 1943, the labour posed a problem caused by the unfitness of the labouring community suffering from hookworm and malaria, difficulty of buying a balanced diet though they were well paid. On the other hand, communities appreciated the impact of insecticide as many found that they no longer suffered from malaria. The Governor himself was pleasantly surprised by the response of the people to D.D.T spraying. Commenting on the final report of D.D.T sprayingin one village he wrote 'the attitude of the inhabitants to D.D.T. spraying is very illuminating… they are highly delighted with spray and state that they can sleep better … it is extremely unusual that any measure for the improvement of the health of backward peoples is welcomed by the peoples themselves'[371]. The sugar estates also collaborated in the spraying of D.D.T. and there were also many voluntary communities in villages which participated in the ant -malaria campaign. It must be recognized that from the beginning there had been early attempts to sensitize the people about malaria.

[369] *Annual Report* 1947, p. 1.
[370] Reddi.J. Sadasivam. *State, Economy and Society in Mauritius 1929-1945*, unpublished Phd.thesis ,University of London 2006, Chapter 1X .p. 242.
[371] CO/167 929/5 Governor Kennedy to Secreatary of State, 28 September 1948.

Mac Gregor is known to have contacted people after the Sunday mass to speak to them. All the reports and schemes incorporated the need to involve the masses in the fight against malaria.

Conclusion

The anti-malaria campaign was the most successful social policy during the war though there were also other initiatives in the field of education and social security. With the election of a number of progressive politicians in the 1948 [372] elections, there was considerable pressure to continue the anti-malaria campaign but also to improve education, labour relations and social services for the welfare of the population. Hence colonial welfare policy with its various motivations toboost theeconomic development of the empire and the productivity of the labour force coalesced with the welfarist aspirations of the new political elite to lay the foundation of a colonial welfare state in the 1950s.