# CHAPTER 5

# Food and Environmental Hygiene Department

## Pest control services

**Audit Commission**
**Hong Kong**
**30 October 2014**

*This audit review was carried out under a set of guidelines tabled in the Provisional Legislative Council by the Chairman of the Public Accounts Committee on 11 February 1998. The guidelines were agreed between the Public Accounts Committee and the Director of Audit and accepted by the Government of the Hong Kong Special Administrative Region.*

Report No. 63 of the Director of Audit contains 10 Chapters which are available on our website at http://www.aud.gov.hk

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# PEST CONTROL SERVICES

# Contents

**Appendices** **Page**

# PEST CONTROL SERVICES

# Executive Summary

1. The Food and Environmental Hygiene Department (FEHD) provides pest control services in public places, targeted at the control of rodents, mosquitoes and other arthropod pests which pose a threat to human health. In 2013-14, the FEHD had some 2,400 pest control and related staff, and its expenditure on pest control services totalled $437 million. Like other places in the world, Hong Kong people are concerned about the control of rodents, mosquitoes and other pests. Every year, thousands of complaints about pest infestation are lodged with the FEHD. From time to time, there have been public concerns about pest infestation and the risk of outbreak of vector-borne diseases such as the mosquito-borne dengue fever and Japanese encephalitis (JE). The Audit Commission (Audit) has recently conducted a review to examine the FEHD's efforts on the provision of pest control services.

## Pest surveillance programmes

2. The FEHD has a number of regular programmes for pest surveillance, covering rodents and mosquitoes. The surveillance information generated from the programmes includes two key indicators, the rodent infestation rate (RIR) and the ovitrap index (OI). The RIR reflects the general situation of rodent infestation in individual districts whereas the OI indicates the extensiveness of the distribution of Aedine mosquitoes (vectors of dengue fever) in the surveyed area (paras. 1.4, 2.2 and 2.3).

3. ***Coverage of areas for rodent surveillance.*** For compiling the RIR, the FEHD places monitoring baits at selected areas to detect the presence of rodents. The RIR of a district is the percentage of baits bitten at the selected areas of the district. As at June 2014, there were 41 selected areas distributed over different districts. Audit noted that the FEHD had been using the same 41 areas for rodent surveillance in the past 10 years. No new areas had been selected for surveillance since 2004. The insufficient geographical coverage of the rodent surveillance programme might undermine the representativeness of the RIR for a district. Audit considers that there is room for widening the network of areas for the rodent surveillance programme (paras. 2.5 to 2.11).

4. ***Factors affecting the rodent surveillance.*** The rodent surveillance could be affected by environmental or human factors (e.g. food remains around a monitoring bait could reduce the attractiveness of the bait). Audit reviewed the records of a rodent surveillance exercise conducted in 2014, and found that of the 2,240 monitoring baits placed, only 1,272 (57%) were free from environmental or human distractions. Notwithstanding that 43% of monitoring baits might be affected by various factors (e.g. application of rodenticides or scattering of food remains nearby), in most cases, no adjustments were made to exclude them in the compilation of RIR (paras. 2.16 to 2.18).

5. ***Coverage of areas for dengue vector surveillance.*** Ovitraps are small plastic containers designed for attracting Aedine mosquitoes (dengue vectors) to lay eggs. For vector surveillance, the FEHD places ovitraps at selected areas. The OI is the percentage of ovitraps found to have positive larval breeding results. Audit noted that the selected areas were not subject to regular review. Many popular places (e.g. Causeway Bay and Stanley) had not been selected as areas for dengue vector surveillance (paras. 2.28 to 2.31).

6. ***Problematic ovitraps.*** Suspected tampering of ovitraps happened from time to time. Since 2013, there had been an increase in the number of problematic ovitraps (e.g. fallen on ground or dried up). In a site visit to Tai Po in May 2014, Audit noted that five of the 55 ovitraps placed in the area were problematic. However, the FEHD frontline staff did not report the problematic ovitraps to the supervisor. The results of the five problematic ovitraps were not excluded from the OI calculation (paras. 2.36 to 2.39).

7. ***Coverage of areas for JE vector surveillance.*** In September 2013, the FEHD set up the JE vector surveillance programme to collect samples of mosquitoes in the summer months (from April to October) to detect the presence of Culex mosquitoes (JE vectors). As at June 2014, the JE vector surveillance programme covered only six areas in Yuen Long, which were considered by the FEHD as high-risk areas. Audit noted that places outside Yuen Long might also be affected by the risk factors of JE. For example, a local JE case occurred in Tuen Mun in August 2014 (paras. 2.45 to 2.52).

8. ***Effectiveness of infestation indicators.*** The RIR and the OI are key infestation indicators (see para. 2). Audit however found that the RIR and the OI did not always fully reflect the actual situation of pest infestation and cases were noted when the two indicators might not be in line with the level of infestation as perceived by the general public (paras. 2.63 and 2.64).

## Pest control operations

9. ***Planning of pest control work.*** Through its 19 District Environmental Hygiene Offices (District Offices), the FEHD carries out pest control operations in public places over the territory. District Offices are responsible for formulating inspection programmes for their own pest control teams. Although the FEHD requires such programmes to be worked out on a weekly basis, Audit found in four District Offices visited that their current set of inspection programmes had generally been used for several years. Audit further noted certain inadequacies in their planning of pest control work, such as uneven workloads among different pest control teams, and construction sites (which were potential mosquito breeding sites) not always covered by inspection programmes (paras. 3.2 to 3.16).

10. ***Supervision and performance of pest control work.*** Audit observed the pest control work of the four District Offices visited and noted various improper work practices in the performance of the pest control work. These included: (a) failing to remove potential mosquito breeding sources; (b) improper handling of rodenticides; (c) improper handling of trapped rodents; and (d) failing to set rodent traps properly. Audit also noted cases in which supervisors did not adequately supervise their pest control teams (paras. 3.30 and 3.31).

11. ***Monitoring the performance of contractors.*** As at June 2014, 1,644 contractor staff were involved in the day-to-day pest control work over the territory. It is the intention of the FEHD to manage the pest control contracts by results. However, performance standards have not been clearly set, against which results of the pest control contracts can be measured (paras. 3.37 to 3.42).

## Promotion of pest control and environmental hygiene

12. ***Provision of pest surveillance information to stakeholders.*** It is the responsibilities of relevant government bureaux/departments to keep their own venues hygienic and prevent pest infestation. To enable them to better respond to the infestation situations at places under their purview, the FEHD proactively provides details of the RIR and the OI to 20 government bureaux/departments (user departments). However, many venues of the user departments were not covered by the FEHD's bait points for rodent surveillance. Moreover, many venues did not have an ovitrap set up by the FEHD for dengue vector surveillance. The RIR and the OI could only provide limited pest surveillance information relating to venues of user departments (paras. 4.4 to 4.7).

## Way forward

13. The FEHD has all along been focusing its pest control services on pests which pose a threat to human health (such as rodents and mosquitoes). Its routine inspection programmes generally do not cover cockroaches, flies, stinging insects and ticks, which can also pose significant health threats to humans. Over the years, the pattern of vector-borne diseases has been changing. More recently, the risks of outbreak of dengue fever and JE have caused increasing public concerns. The FEHD needs to keep its strategy on pest control under constant review (paras. 5.2 to 5.8).

## Audit recommendations

14. **Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has *recommended* that the Director of Food and Environmental Hygiene should:**

*Pest surveillance programmes*

(a) **consider widening the network of surveyed areas selected for the rodent surveillance programme (para. 2.26(a));**

(b) **prevent recurrence of incidents in which the rodent surveillance was affected by various environmental or human factors, and make necessary adjustments to the compilation of the RIR (para. 2.26(d) and (e));**

(c) **keep the geographical coverage of surveyed areas for dengue vector surveillance under regular review (para. 2.42(a));**

(d) **step up actions to tackle the increasing number of problematic ovitraps identified and remind all FEHD staff concerned of the need to properly deal with problematic ovitraps (para. 2.42(c));**

(e) **review the coverage of geographical areas for JE vector surveillance (para. 2.53);**

(f) **review the effectiveness of the RIR and the OI in providing surveillance information for planning and evaluation of pest control work (para. 2.68(a));**

*Pest control operations*

(g) **provide adequate guidelines to help District Offices regularly update their inspection programmes (para. 3.27(a));**

(h) **ensure more efficient and cost-effective deployment of staff resources for pest control work (para. 3.27(b));**

(i) **review the adequacy of the supervisory practices of pest control teams, with a view to improving the performance of pest control staff (para. 3.33(a));**

(j) **provide guidelines to help District Offices set performance standards against which the results of contractors' pest control work can be measured (para. 3.45(b));**

*Promotion of pest control and environmental hygiene*

(k) **in consultation with the relevant user departments, review the adequacy of the pest surveillance information currently provided to them for assessing the pest infestation situations of venues under their purview (para. 4.11(a));**

*Way forward*

(l) **critically review the FEHD's pest control strategy, taking on board Audit's observations and recommendations (para. 5.9(a)); and**

(m) **continue to keep abreast of the latest trends of vector-borne diseases locally and in places outside Hong Kong (para. 5.9(b)).**

## Response from the Administration

15. The Director of Food and Environmental Hygiene agrees with the audit recommendations.

# PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines the audit objectives and scope.

## *Background*

1.2 Pests such as rodents (rats and mice), mosquitoes, cockroaches, fleas and mites are a nuisance to humans, and can cause physical damages to properties and contaminate foodstuffs. In particular, some pests (e.g. rodents and certain mosquito species) are disease vectors that pose a threat to public health.

1.3 Rodents are nocturnal and social animals with an average life span of about one year. They are good at climbing, jumping and swimming. In Hong Kong, the commonly found rodent species are sewer rats (also known as Norway rats), house rats (also known as roof rats) and mice. Rodents can help transmit diseases like plague, urban typhus, scrub typhus and spotted fever (Note 1).

1.4 Mosquitoes are flying insects which breed in places such as permanent stagnant water and containers. Adult mosquitoes have gone through a life cycle of four stages (eggs, larvae, pupae and adults) and can live up to two to three weeks. Female mosquitoes of most species have to feed on animal blood for the development of eggs (Note 2). In Hong Kong, the commonly found mosquito species include Aedine mosquitoes (see Photograph 1), Culex mosquitoes (see Photograph 2) and Anopheline mosquitoes (see Photograph 3). These species can be vectors of dengue fever, Japanese encephalitis (JE) and malaria.

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**Note 1:** *Plague and urban typhus are flea-borne diseases. Scrub typhus is a mite-borne disease. Spotted fever is a tick-borne disease. Rodents may carry the disease-transmitting fleas, ticks and mites on their bodies.*

**Note 2:** *Male adult mosquitoes usually feed on plant juice.*

**Photographs 1 to 3**

**Mosquito species commonly found in Hong Kong**

| Photograph 1 | Photograph 2 | Photograph 3 |
|---|---|---|
|  |  |  |
| **Aedine mosquito** | **Culex mosquito** | **Anopheline mosquito** |

*Source: FEHD records*

1.5 The Food and Environmental Hygiene Department (FEHD) is the Government's advisor on pest control matters. Under the Public Health and Municipal Services Ordinance (Cap. 132), the Director of Food and Environmental Hygiene is the designated authority in the control of vermin (e.g. rodents — Note 3) infestation and mosquito breeding.

## Pest control services

1.6 The FEHD provides pest control services in public places on a sustained basis, targeted at the control of rodents, mosquitoes and other arthropod (Note 4) pests which pose a threat to human health. The prevention of pest-borne diseases is one of the major work of the FEHD.

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**Note 3:** *According to the Public Health and Municipal Services Ordinance, vermin include rodents, as well as cockroaches, mites, ticks, bugs, fleas, lice and itch mites (and the eggs, larvae, nymphs or pupae thereof).*

**Note 4:** *An arthropod is an invertebrate animal having an external skeleton, a segmented body and jointed appendages. Examples of arthropods are insects and spiders.*

1.7 The FEHD adopts an integrated approach to controlling pests, putting emphasis on the effective use of pesticides and continuous improvements in environmental hygiene. Under this approach, two key services are delivered through different sections of the FEHD, as follows:

(a) ***Pest control advisory services.*** Under the Administration and Development Branch, the Pest Control Advisory Section (PCAS) provides government departments (including other FEHD sections) and the public with professional advice on prevention and control of pests affecting public health. The PCAS carries out surveillance and monitoring of pest problems, and compiles indicators for assessing pest infestation (e.g. the rodent infestation rate — see para. 2.3); and

(b) ***Pest control operational services.*** Pest control staff of the Environmental Hygiene Branch carry out pest control work to prevent and control the breeding of disease vectors (e.g. rodents, mosquitoes and other arthropod pests with public health significance). Both preventive work (e.g. removal of potential mosquito breeding places, and cutting grass that provides habitats for mosquitoes — see Photograph 4) and control work (e.g. applying insecticides — see Photograph 5) are conducted. The pest control staff are deployed to the Branch's 19 District Environmental Hygiene Offices (District Offices) for providing services over the territory. An organisation chart of the pest control services of the FEHD is at Appendix A.

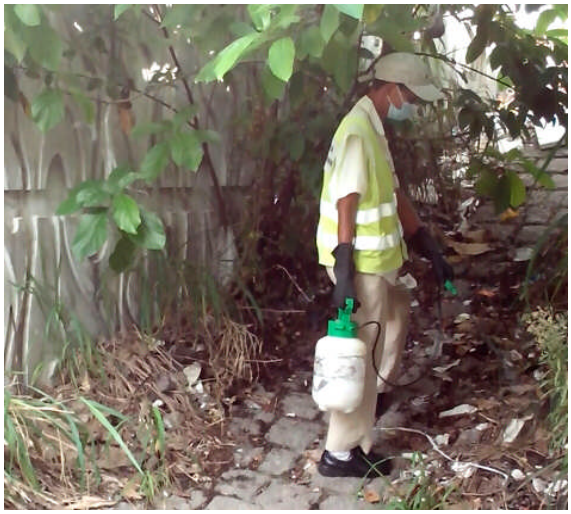
**Photographs 4 and 5**

**Provision of pest control operational services (Examples)**

**Photograph 4**

**Cutting grass to remove mosquito habitats**

**Photograph 5**



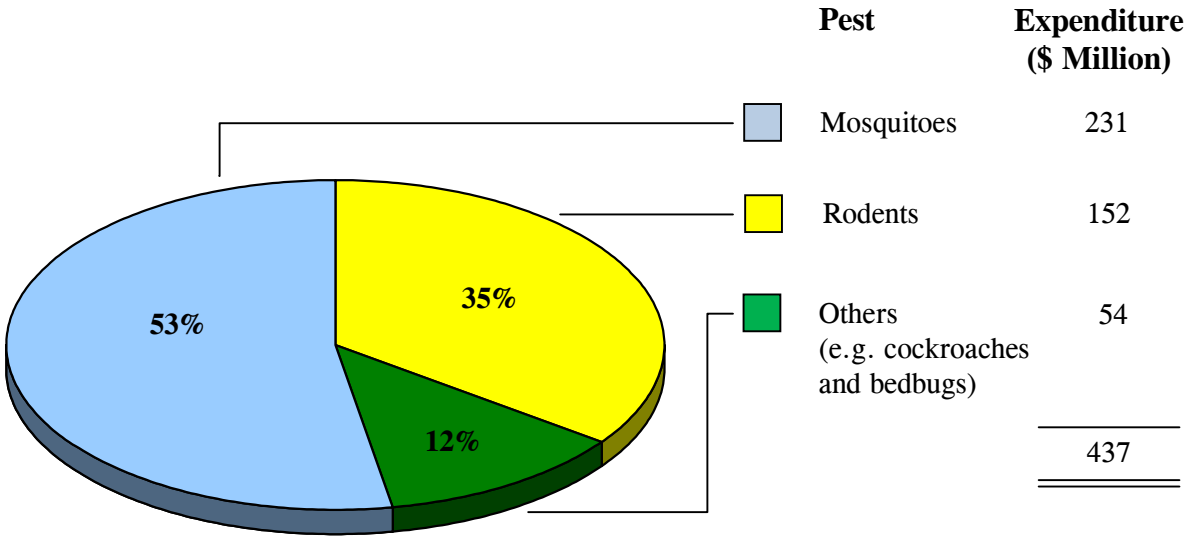
**Applying insecticides**

*Source: Photographs taken by the Audit Commission on 30 June 2014*

1.8 As at June 2014, the FEHD had a team of 2,419 pest control and related staff (including 73 staff of the PCAS) for the delivery of pest control services (Note 5). In 2013-14, the FEHD's expenditure on pest control services totalled $437 million, a large majority (88%) of which was used on rodent and mosquito control (see Figure 1).

**Figure 1**

**The FEHD's expenditure on pest control services (2013-14)**




*Source: FEHD records*

**Note 5:** *Of the 2,419 staff, 1,644 were staff of contractors who conducted pest control work for the FEHD under service contracts.*

## Public concerns about pest infestation

1.9 Rodent infestation is a common problem faced by many countries in the world. Hong Kong people are also concerned about the control of rodents and other pests. Every year, the FEHD received thousands of complaints about pest infestation, mainly relating to rodents and mosquitoes. In 2013, the FEHD received 6,813 complaints about rodents and 6,421 complaints about mosquitoes (see Table 1).

**Table 1**

**Complaints about pest infestation**
**(2013)**

| Region | Pest being complained about | | | Total no. of complaints |
|---|---|---|---|---|
| | Rodent (No. of complaints) | Mosquito (No. of complaints) | Others (e.g. cockroach and bedbug) (No. of complaints) | |
| Hong Kong and Islands | 1,908 | 1,737 | 1,049 | 4,694 |
| Kowloon | 2,373 | 1,459 | 642 | 4,474 |
| New Territories | 2,532 | 3,225 | 3,434 | 9,191 |
| Total | 6,813 | 6,421 | 5,125 | 18,359 |

*Source: FEHD records*

1.10 Members of District Councils have also expressed concerns about rodent and mosquito problems. For example, at a meeting of a District Council held in October 2013, it was considered that rodent infestation was a problem in the entire District, particularly in individual black spots. At a meeting of another District Council held in November 2013, Members urged that the FEHD should follow up serious problems of mosquito infestation in the District.

1.11 From time to time, discussions were held about pest infestation at the Panel on Food Safety and Environmental Hygiene of the Legislative Council (LegCo). Members of LegCo also expressed concern about pest infestation, such as rodent problems in markets, wharfs, old districts as well as in areas where there was a high concentration of restaurants. Besides, it was noted that individual areas had problems of mosquito infestation. The Administration was urged to step up the related prevention and control measures.

## *Recent concerns about vector-borne diseases*

1.12 According to the World Health Organisation (WHO), vector-borne diseases are infectious and affect people worldwide, with more than half of the world's population at risk from such diseases. Every year, there are more than one billion cases, leading to over one million deaths worldwide. "Vector-borne diseases" is the theme of the 2014 World Health Day of the WHO.

1.13 In Hong Kong, common vector-borne diseases are the mosquito-borne dengue fever, JE and malaria, the mite-borne scrub typhus, and the tick-borne spotted fever. Although Hong Kong did not have epidemics of vector-borne diseases in recent years, there were sporadic cases reported for some diseases such as dengue fever (see Table 2), which is an endemic disease in most Southeast Asian countries (Note 6) and is not uncommon in the Guangdong Province in the Mainland.

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**Note 6:** *For example, in 2014 (up to September), Singapore had recorded some 15,000 dengue fever cases, Malaysia some 70,000 cases and Thailand some 24,000 cases.*

**Table 2**

**Reported cases of selected vector-borne diseases (2009 to 2013)**

| Disease | No. of reported cases | | | | | |
|---|---|---|---|---|---|---|
| | **2009** | **2010** | **2011** | **2012** | **2013** | **2013 vs 2009 (+ increase/ − decrease)** |
| ***Mosquito-related diseases*** | | | | | | |
| Dengue fever | 43 | 83 | 30 | 53 | 103 | +60 (+140%) |
| JE | 0 | 0 | 1 | 3 | 6 | +6 (Note) |
| Malaria | 23 | 34 | 41 | 26 | 20 | -3 (-13%) |
| ***Rodent-related diseases*** | | | | | | |
| Plague | 0 | 0 | 0 | 0 | 0 | 0 (Note) |
| Scrub typhus | 20 | 17 | 7 | 23 | 28 | +8 (+40%) |
| Urban typhus | 5 | 2 | 2 | 3 | 1 | -4 (-80%) |
| Spotted fever | 13 | 22 | 20 | 10 | 22 | +9 (+69%) |

*Source: Department of Health's published information*

*Note: The percentage increase in reported cases from 2009 to 2013 cannot be calculated because there was no reported case in 2009.*

1.14 More recently, a number of vector-borne disease cases reported in the past few months have caused public concerns about pest infestation. For example, in 2014:

(a) ***Dengue fever.*** 94 (1 local and 93 imported) cases of dengue fever had been reported up to 30 October;

(b) ***JE.*** Five (3 local and 2 imported) JE cases had been reported up to 30 October; and

(c) ***Scrub typhus.*** 16 local cases of scrub typhus had been reported up to end of September. This had given rise to concerns about this mite-borne disease.

## Audit review

1.15 The Audit Commission (Audit) has recently conducted a review to examine the FEHD's efforts on the provision of pest control services, focusing on the following areas:

(a) pest surveillance programmes (PART 2);

(b) pest control operations (PART 3);

(c) promotion of pest control and environmental hygiene (PART 4); and

(d) way forward (PART 5).

Audit has found that there is room for improvement in the above areas and has made a number of recommendations to address the issues.

## Acknowledgement

1.16 Audit would like to acknowledge with gratitude the assistance and full cooperation of the staff of the FEHD during the course of the audit review.

# PART 2: PEST SURVEILLANCE PROGRAMMES

2.1 This PART examines the FEHD's surveillance programmes for monitoring pest problems. Audit has found room for improvement in the following areas:

(a) rodent and rat-flea surveillance (paras. 2.4 to 2.27);

(b) dengue vector surveillance (paras. 2.28 to 2.43);

(c) JE vector surveillance (paras. 2.44 to 2.54);

(d) malaria vector surveillance (paras. 2.55 to 2.62); and

(e) effectiveness of infestation indicators (paras. 2.63 to 2.69).

## Surveillance information about pests

2.2 The PCAS of the FEHD carries out pest surveillance programmes to assess pest infestation over the territory. As at June 2014, the FEHD had five regular programmes for pest surveillance, covering rodents and mosquitoes (see Table 3). Details of the programmes are at Appendix B. The programmes provide surveillance information for the FEHD to plan and evaluate its pest control work.

**Table 3**

**Pest surveillance programmes of the FEHD**
**(June 2014)**

| Programme | Vector/pest being monitored |
|---|---|
| ***Rodent-related*** | |
| Rodent surveillance programme | Rodents (rats and mice) |
| Rat-flea survey | Rat fleas |
| ***Mosquito-related*** | |
| Dengue vector surveillance programme | Aedine mosquitoes |
| JE vector surveillance programme | Culex mosquitoes |
| Malaria vector surveillance programme | Anopheline mosquitoes |

*Source: FEHD records*

2.3 The surveillance information generated from the programmes includes two key indicators, the rodent infestation rate (RIR — see paras. 2.4 to 2.22) and the ovitrap index (OI — see paras. 2.28 to 2.41). The RIR and the OI provide territory-wide surveillance information about the pests. The FEHD has informed the LegCo Panel on Food Safety and Environmental Hygiene that:

(a) the RIR reflects the general situation of rodent infestation in individual districts. The FEHD has been making use of the RIR and the trend movement of the RIR as the basis for devising anti-rodent measures and assessing the overall efficacy of rodent prevention and disinfestation work; and

(b) the OI indicates the extensiveness of the distribution of Aedine mosquitoes in the surveyed area. The OI helps evaluate the effectiveness of mosquito prevention and control work carried out by various parties, and provide surveillance information to the public and for making timely adjustments to the FEHD's mosquito control strategies and measures.

## Rodent and rat-flea surveillance

2.4 The RIR is compiled twice a year. It is a key indicator of rodent infestation under the rodent surveillance programme (see para. 2.3(a)). In addition, the FEHD also conducts a rodent-related survey every year, namely the rat-flea survey (see paras. 2.23 to 2.25).

2.5 For compiling the RIR, the FEHD places non-poisonous baits (monitoring baits — see Photograph 6) at selected areas to detect the presence of rodents. Every time the RIR is compiled, around 55 baits are placed at each selected area for 3 days. As at June 2014, there were a total of 41 selected areas distributed over 19 districts of the territory. On average, each district had about two selected areas. The RIR of a district is the percentage of baits gnawed (bitten) at the selected areas of the district during the 3-day survey period. In 2013, the RIRs of individual districts ranged from 0% to 8.3% (see Appendix C).

**Photograph 6**

**A monitoring bait set at a rear lane**

*Source: Photograph taken by Audit on 19 May 2014*

2.6 For analysis of surveillance results, the FEHD categorises the selected areas into "residential areas", "industrial areas" and "rear lanes" (see Appendix D).

## *Coverage of areas for rodent surveillance*

2.7 As can be seen from Appendix D, the rodent surveillance programme did not cover all major types of areas in each district. For example:

(a) ***Rear lanes.*** The rear lanes of four (21%) districts (i.e. Southern, Shatin, Tuen Mun, and Kwai Tsing) had not been covered for surveillance;

(b) ***Residential areas.*** The residential areas of seven (37%) districts (i.e. Central/Western, Wan Chai, Kowloon City, Kwun Tong, Mong Kok, Yau Tsim, and Tsuen Wan) had not been covered for surveillance; and

(c) ***Industrial areas.*** Industrial areas were only covered for surveillance in five (26%) districts. Of the remaining 14 (74%) districts, Audit noted that there were industrial areas in at least five districts, namely Shatin, Tai Po, Tsuen Wan, Yuen Long, and Kwai Tsing. However, the industrial areas of these districts had not been covered for surveillance.

2.8 Upon enquiry, the FEHD informed Audit in September 2014 that the sites selected for setting monitoring baits for rodent surveillance were areas that required particular attention in public places as nominated by District Offices. Any place of a reasonable size for carrying out surveillance would be considered for inclusion in the surveillance programme should the place has:

(a) a rodent problem persistently or has high potential in getting a rodent problem; and

(b) high human activities.

2.9 In this regard, Audit noted that the FEHD had been using the same 41 areas (see Appendix D) for rodent surveillance for 10 years. FEHD records indicated that no new areas had been selected for surveillance since 2004.

Meanwhile, Members of District Councils and LegCo had expressed concerns about rodent problems in markets, wharfs, old districts as well as in areas where there was a high concentration of restaurants (see paras. 1.10 and 1.11). For example, at a meeting of the Food, Environment, Hygiene and Works Committee of the Central and Western District Council on 17 October 2013, Members commented that:

(a) the number of dead and live rodents in the Shek Tong Tsui Market was growing year by year. In an earlier visit conducted by the Committee Chairman to the Market and a nearby vacant private estate, many rodents were found at midnight;

(b) the problem of rodent infestation was not unique to the Shek Tong Tsui Market, but was found across the Central and Western District; and

(c) the responsible department should take appropriate measures to address the problem.

2.10 Audit further noted that the Shek Tong Tsui Market and the nearby vacant private estate were located along Queen's Road West. However, as at September 2014, Queen's Road West and its nearby public places had not been covered by the rodent surveillance programme (Note 7).

2.11 As LegCo has been informed, the RIR should reflect the general situation of rodent infestation in individual districts, and it is the basis for devising anti-rodent measures and assessing their overall efficacy (see para. 2.3(a)). The insufficient geographical coverage of the rodent surveillance programme may undermine the representativeness of the RIR for a district (see para. 2.7). This is not conducive to reflecting the general situation of infestation in the district, nor is this conducive to helping the FEHD plan and evaluate its rodent control work (see para. 2.9(a) to (c)). Audit considers that there is room for widening the network of areas for the rodent surveillance programme in order to ensure that the

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**Note 7:** *FEHD records indicated that the rodent surveillance programme for Central and Western District covered only Queen's Road Central, Hollywood Road and Third Street. Queen's Road West and other areas had not been included in the programme.*

surveillance information generated by the programme (i.e. the RIR) could better reflect the infestation situation.

### *Effectiveness of the monitoring baits*

2.12 For compiling the RIR, the FEHD places non-poisonous baits (monitoring baits) at selected areas to detect the presence of rodents. The FEHD has all along been using raw sweet potatoes as monitoring baits. There have been criticisms (e.g. from the public) that raw sweet potatoes might not be attractive to rodents.

2.13 In 2007, the FEHD's PCAS (see para. 1.7(a)) had adopted a commercial monitoring bait (bait block) for rodent surveillance. The bait block was a tailor-made product for rodent survey. The PCAS conducted testing on the bait block before adopting it as a monitoring bait for the rodent surveillance programme. Testing results showed that the bait block was particularly attractive to rodents at rear lanes. FEHD staff placed both the bait block and sweet potato at each area selected for rodent surveillance, and observed the percentage of bait blocks and/or sweet potatoes bitten at the area. This method had been used until October 2009. Table 4 shows that during the period when bait blocks were used together with sweet potatoes, the RIR stayed at a level ranging from 3.6% (Phase 2 of 2009) to 8.5% (Phase 1 of 2009).

**Table 4**

**RIRs**
**(2006 to 2010)**

| Year (Phase — Note 1) | RIR | Monitoring bait |
|---|---|---|
| 2006 (Phase 1) | 2.5% | Sweet potato |
| 2006 (Phase 2) | 3.3% | |
| 2007 (Phase 1) | 4.4% | Sweet potato and bait block |
| 2007 (Phase 2) | 5.3% | |
| 2008 (Phase 1) | 6.0% | |
| 2008 (Phase 2) | 6.6% | |
| 2009 (Phase 1) | 8.5% | |
| 2009 (Phase 2) | 3.6% | Sweet potato and bait block (Note 2) |
| 2010 (Phase 1) | 1.3% | Sweet potato |
| 2010 (Phase 2) | 1.7% | |

*Source: FEHD records*

*Note 1: The RIR was calculated twice a year (i.e. Phase 1 and Phase 2).*

*Note 2: During the survey period from July to December 2009, the bait block was used up to 18 October 2009.*

2.14 Audit noted that the PCAS had considered that the bait blocks could increase the sensitivity of rodent surveillance, and help the FEHD get a more accurate picture of rodent infestation. However, in November 2009, the FEHD decided that the use of bait blocks should be discontinued (with effect from 19 October 2009). According to FEHD records, the reason was to maintain

consistency in rodent surveillance. The RIR for Phase 2 of 2009 (July to December 2009) was therefore compiled using different combination of monitoring baits, namely, sweet potatoes and bait blocks (up to 18 October 2009), and only sweet potatoes (19 October 2009 and thereafter). In the event, the RIR showed a noticeable drop, from 8.5% (Phase 1 of 2009) to 3.6% (Phase 2 of 2009 — see Table 4). The RIR dropped further to 1.3% (Phase 1 of 2010) when only sweet potatoes were used for the whole survey period. In its 2012 annual review, the PCAS stated that it would keep in view the latest availability of other suitable monitoring baits.

2.15 Upon enquiry, the FEHD informed Audit in September 2014 that:

(a) in November 2009, the FEHD decided that the use of bait blocks should be discontinued due to their shortcomings, including their poor durability under moist condition when they were set in rear lanes and open spaces where the bait blocks were readily affected by dripping from pipes, washing activities and rain, etc. The bait became soft and even dissolved making the detection of rodents' gnawing marks difficult;

(b) as recommended by the manufacturer, bait blocks should be used together with bait boxes (i.e. a box for holding baits, with openings for access by rodents) for better results or protection from bad weather;

(c) taking into consideration the shortcomings of bait blocks and the difficulties in setting bait boxes in the local situation as well as the total cost of setting the bait (bait blocks plus bait boxes), bait blocks were not selected to replace sweet potatoes as the bait for surveillance. Besides, sweet potatoes were available all the year round; and

(d) the use of both bait blocks and sweet potatoes would have rendered the RIR during the period not directly comparable with other periods. The FEHD should have made proper adjustment in announcing the relevant RIR.

## *Factors affecting rodent surveillance*

2.16 Apart from the use of unattractive baits, the results of rodent surveillance could also be affected by other environmental or human factors. For example, food remains around a monitoring bait could reduce the attractiveness of the bait, and the application of rodenticides nearby could affect rodent activities around the monitoring bait.

2.17 To improve the effectiveness of rodent surveillance, the PCAS gives District Offices advance notifications of surveillance activities in their districts. District Offices are expected to clear food attractions around the monitoring baits, and temporarily suspend nearby rodent control operations during the 3-day survey period (see para. 2.5). However, this had not been effectively done. Audit reviewed the records of rodent surveillance for Phase 1 of 2014, and found that:

(a) of the 2,240 monitoring baits placed, only 1,272 (57%) were free from environmental or human distractions; and

(b) the remaining 968 (43%) monitoring baits were subject to different kinds of interference which could affect their results. Incidents affecting some of the 968 baits included application of rodenticides nearby, scattering of food remains nearby and baits turned bad.

2.18 It was not satisfactory that some 43% of monitoring baits had been affected by various environmental and human factors which might undermine the bait attractiveness and the effectiveness of rodent surveillance. Notwithstanding that a large number of monitoring baits might be affected by various factors, Audit noted that, in most cases, no adjustments were made to exclude them in the compilation of RIR.

2.19 Upon enquiry, the FEHD informed Audit in September 2014 that most incidents would not have any effect on the RIR, as follows:

(a) ***Application of rodenticides nearby.*** The rodenticides used locally are chronic poisons which do not give immediate killing effect on rodents. Gnawing activities of rodents will not be affected by the presence of rodenticides;

(b) ***Scattering of food remains nearby.*** Gnawing activities of rodents will not be affected by the presence of food remains. Fresh baits will be set every day during the survey period to ensure their attractiveness. Human activities in rear lanes are unavoidable. Surveillance data obtained under the same conditions are comparable; and

(c) ***Baits turned bad.*** Fresh baits will be set every day during the survey period. Gnawing marks of rodents on baits turned bad (e.g. damaged by slugs) could easily be distinguished from marks left by non-targeted animals.

2.20 Audit notes that the above views are at variance with advice given by the PCAS. In an internal review report of 2012, the PCAS explained the following limitations of rodent infestation surveys:

(a) ***Food remains nearby.*** Rodents had their own preference of food and might choose to take food that was readily available instead of the baits. Under these circumstances, the RIR obtained might under-estimate the actual rodent problem;

(b) ***Baits turned bad.*** Whether a rodent would choose to gnaw on a bait might also depend on the condition and freshness of the bait which in turn was affected by weather factors (e.g. rainfall and humidity). Rain might damage the baits, while moisture level might affect the bait palatability; and

(c) ***Baits damaged by slugs.*** Baits were sometimes eaten/damaged by non-target animals (e.g. slugs). Although the baits were replenished on the ensuing day if they were lost on the first day of the survey period, the duration in which the baits were present at a specific point was shortened. Therefore, the RIR obtained from the survey might under-estimate the rodent situation.

2.21 As regards the application of rodenticides near a monitoring bait (see para. 2.19(a)), Audit notes that the FEHD's rodenticide baits consist of sweetened cereals (Note 8) which are also attractive food for rodents. Applying the rodenticides near a monitoring bait could be similar to scattering food remains around (see para. 2.20(a)). There were cases that rodenticides were applied a few days before the survey period.

2.22 Notwithstanding the FEHD's explanations in paragraph 2.19, taking into consideration the views in paragraphs 2.20 and 2.21, there remains a risk that the possible impact of incidents may affect the rodent surveillance exercise. To ensure that the RIR could fairly reflect the actual situation of rodent infestation, there is a need for the FEHD to look into and better control those factors and make appropriate adjustments to the compilation of the RIR (e.g. excluding those affected baits from the RIR calculation).

### *Rat-flea survey*

2.23 Rat fleas are carriers of diseases such as plague. The FEHD conducts rat-flea surveys to assess the potential plague risk for humans. Every year, the FEHD focuses on certain types of areas (e.g. markets and rear lanes) in conducting the rat-flea survey. Live rats are sampled from the areas for the collection of rat fleas for analysis (Note 9).

2.24 Audit reviewed the rat-flea surveys conducted during the period 2010 to 2014 (up to June 2014). Audit found that each survey covered only some of the 19 districts (see Table 5).

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**Note 8:** *The FEHD's rodenticide baits are normally made of uncooked cereals, sugar, oil and anticoagulant rodenticides.*

**Note 9:** *The FEHD counts the number of rat fleas. The rat-flea index is calculated based on the following formula:*

$$\textit{Rat-flea index} = \frac{\textit{Number of rat fleas collected from the rats examined}}{\textit{Number of rats examined}}$$

*According to the WHO, a rat-flea index greater than 1 represents an increased potential plague risk for humans.*

**Table 5**

**Rat-flea surveys**
**(2010 to June 2014)**

| Year | Theme (i.e. type of areas surveyed) | No. of districts | | Total no. of districts |
|---|---|---|---|---|
| | | Survey conducted | Survey not conducted | |
| 2010 | Typhoon shelters | 9 (Note 1) | 10 (Note 2) | 19 |
| 2011 | Squatter areas | 6 | 13 | 19 |
| | Fixed pitch hawker stalls | 6 | 13 | 19 |
| 2012 | Markets | 10 | 9 | 19 |
| | Wholesale food markets | 2 | 17 (Note 3) | 19 |
| 2013 | Rear lanes | 12 | 7 | 19 |
| 2014 (up to June) | Rural/semi-rural villages | 12 | 7 | 19 |

*Source: Audit analysis of FEHD records*

*Note 1: Of the 13 typhoon shelters located in the 9 districts, 12 were covered by the rat-flea survey.*

*Note 2: One typhoon shelter was located in the 10 districts.*

*Note 3: One wholesale food market was located in the 17 districts.*

2.25 Audit noted that more districts could have been selected for survey. For example, in 2013, the theme of survey was "rear lanes". However, the rear lanes in 7 districts were not selected for survey. Moreover, in 2012, one of the themes of survey was "markets", which was a community facility available in every district. However, the markets in 9 districts were not selected for survey.

## Audit recommendations

2.26 **Audit has *recommended* that the Director of Food and Environmental Hygiene should:**

(a) **consider widening the network of surveyed areas selected for the rodent surveillance programme (e.g. selecting areas other than residential areas, industrial areas and rear lanes on a rotational basis);**

(b) **critically review the effectiveness of using raw sweet potatoes as a monitoring bait for rodent monitoring;**

(c) **keep in view the availability of more effective baits for monitoring rodents;**

(d) **critically look into the incidents in which the rodent surveillance was affected by various environmental or human factors (e.g. application of rodenticides nearby), and take effective measures to prevent recurrence of such incidents in future;**

(e) **ensure that necessary adjustments are made to the compilation of the RIR (e.g. excluding those affected baits from the RIR calculation) in order to improve the precision of the infestation indicator; and**

(f) **consider enhancing the annual rat-flea surveys to cover all districts in the territory (e.g. on a rotational basis) in order to make a more comprehensive assessment of the plague risk.**

## Response from the Administration

2.27 The Director of Food and Environmental Hygiene agrees with the audit recommendations. She has said that:

(a) the network of survey seeks to cover areas with the environmental conditions which favour rodent activities. The FEHD will review the network on a yearly basis and adjust the network if appropriate;

(b) the FEHD will continue to keep in view rodent infestation assessment methods recommended by the WHO and adopted by major cities around the world, and adopt the method and the kind of baits which are most suitable for use in our local situation;

(c) the rodent infestation survey, like all other surveillance methods, has its limitations. The FEHD has taken measures to increase the sensitivity of the rodent surveillance including replacing the bait every day to maintain its freshness and informing parties concerned of the surveillance schedule in advance and reminding them to suspend all rodent control measures during the rodent infestation survey period. While it is not always possible to eliminate all environmental and human factors on the ground, the PCAS will endeavour to further refine the survey by providing detailed guidelines on data adjustment in enumeration of the RIR to the relevant staff and seek stakeholders' assistance in minimising environmental and human factors; and

(d) the FEHD will consider selecting appropriate sites from more districts for carrying out the rat-flea survey as far as practicable having regard to resource availability.

## Dengue vector surveillance

2.28 Ovitraps are small plastic containers designed for attracting dengue vectors, Aedine mosquitoes, to lay eggs (see Photograph 7). Every month, the FEHD places ovitraps at selected areas (see Appendix B) for a week to detect the larval breeding rate of Aedine mosquitoes (Note 10). The OI is the percentage of ovitraps found to have positive larval breeding results (Note 11). The OI for an area indicates the extensiveness of the distribution of Aedine mosquitoes in the area. In 2013, the OIs of individual areas ranged from 0% to 36.2% (see Appendix E).

**Note 10:** *The species to be monitored is Aedes albopictus.*

**Note 11:** *Normally, around 50 ovitraps are placed at each selected area.*

**Photograph 7**

**An ovitrap**


*Source: Photograph taken by Audit on 16 May 2014*

## *Coverage of geographical areas*

2.29 As at June 2014, the areas selected for surveillance included 44 areas throughout the territory and 30 areas in the port areas (see Appendix E).

2.30 The areas for vector surveillance were not subject to regular review. The last review was made in 2011, when the number of areas (outside the port areas) was increased by 6, from 38 to 44 areas. Table 6 shows the FEHD's justifications for adding the 6 areas in 2011.

**Table 6**

**Six areas added for dengue vector surveillance**
**(2011)**

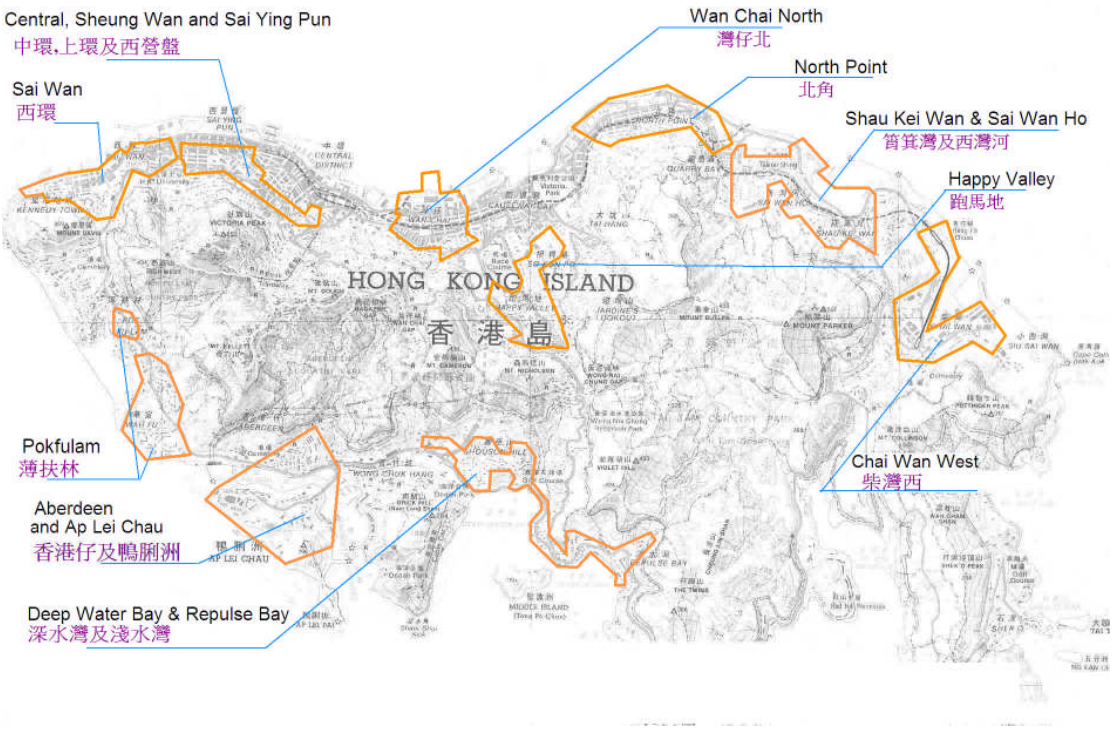
| Area added | | Justification |
|---|---|---|
| 1 | Deep Water Bay and Repulse Bay | A local case of dengue fever found in the area |
| 2 | Shau Kei Wan and Sai Wan Ho | Being residential areas with schools and high concentration of people |
| 3 | Hung Hom | |
| 4 | Sheung Kwai Chung | |
| 5 | Sai Kung Town | Being residential areas with frequent visitors and medium population density |
| 6 | So Kwun Wat | |

*Source: FEHD records*

2.31 Audit noted that, apart from these 6 areas, many places over the territory could also meet the criteria for inclusion in the surveillance programme. For example, on Hong Kong Island, Stanley is a mix of residential areas and tourist attractions, and Causeway Bay is crowded with residents, visitors and students from schools in the area. However, such places had not been selected as areas for dengue vector surveillance (see Figure 2).

**Figure 2**

**Areas for dengue vector surveillance outside the port areas**
**Hong Kong Island**
**(June 2014)**




*Source: FEHD records*

2.32 The insufficient coverage of geographical areas for dengue vector surveillance (see Figure 2 for the coverage of Hong Kong Island for example) is a cause for concern. In this connection, Audit noted that at a recent meeting of the LegCo Panel on Food Safety and Environmental Hygiene in May 2014, concerns were raised about the fact that housing estates at Kai Tak New Development Area were not selected for dengue vector surveillance, and the FEHD was urged to set up more ovitraps.

## *Strategic review of ovitrap distribution*

2.33 For each of the selected areas, the FEHD sets up a number of ovitraps for dengue vector surveillance. As at June 2014, a total of 2,371 ovitraps were set up in the 44 areas (outside the port areas).

2.34 Audit noted that the FEHD had in the past conducted annual strategic reviews of ovitrap locations within the selected areas, taking account of relevant factors such as past experience and new developments in the districts (Note 12). The FEHD also had an internal working group to consider the review results (Note 13). In December 2007, the working group endorsed an updated strategic locations of ovitraps which had since been adopted for implementation. However, no further reviews had been conducted since then. As at June 2014, more than six year had elapsed. The strategic locations of ovitraps within the selected areas might warrant another review.

### *Suspected tampering of ovitraps*

2.35 In 2006, the FEHD noted an incident of suspected tampering of ovitraps, involving some 200 ovitraps in a number of areas (Note 14). Later in the same year, the FEHD informed the LegCo Panel on Food Safety and Environmental Hygiene that it had taken improvement measures in this regard, including considering ways and means of improving the security and the design of ovitraps. According to the FEHD, the improvement measures have been implemented. For example, the FEHD has improved the design of ovitraps by adding a cap to cover the ovitrap, so as to avoid inadvertent spilling of pesticides into the ovitraps during mosquito control operations. The FEHD has also sealed the ovitraps with stickers. In June 2011, the FEHD informed the LegCo Panel on Food Safety and Environmental Hygiene that if the seals were found to be broken or tampered with, data of the ovitrap concerned would not be used for compiling the OI. The FEHD would refer suspected cases of tampering of ovitraps to the police.

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**Note 12:** *Other relevant factors included emerging public health needs, public requests for setting up new ovitraps, views of District Councils and suggestions from District Offices.*

**Note 13:** *The working group was headed by the Assistant Director (Administration) and comprised FEHD staff from the Environmental Hygiene Branch and the PCAS.*

**Note 14:** *In September 2006, a staff member of one of the pest control contractors complained that ovitraps were suspected to have been tampered with. The FEHD examined all ovitraps over the territory, and found that some 200 ovitraps seemed to have been tampered with. The affected ovitraps were located in Kwai Chung, Lai King, Tsing Yi, Sham Shui Po (East) and Kwun Tong (Central).*

2.36 However, in spite of the FEHD's efforts, suspected tampering of ovitraps still happened from time to time. Table 7 shows the number of problematic ovitraps (e.g. fallen on ground or dried up — Note 15) reported in recent years. Some of these problematic cases might involve suspected tampering of ovitraps, for example:

(a) in August 2011, 31 (56%) ovitraps in Sham Shui Po East were sprayed with pesticides; and

(b) in November 2013, 21 (38%) ovitraps in Wan Chai North were sprayed with oily substances.

**Table 7**

**Problematic ovitraps reported**
**(2010 to June 2014)**

| Year | No. of cases reported (No. of ovitraps involved) |
|---|---|
| 2010 | 5 (12) |
| 2011 | 10 (50) |
| 2012 | 9 (16) |
| 2013 | 21 (102) |
| 2014 (up to June) | 15 (76) |
| Total | 60 (256) |

*Source: Audit analysis of FEHD records*

**Note 15:** *Ovitraps are filled with dechlorinated water to provide a breeding environment for Aedine mosquitoes.*

2.37 As can be seen from Table 7, the large increase in the number of problematic ovitraps since 2013 is a cause for concern. The large number of problematic ovitraps might have an impact on the OI.

2.38 Upon enquiry, the FEHD informed Audit in September 2014 that:

(a) of the 60 reported cases of problematic ovitraps, obvious signs to confirm tampering had not been found in most cases;

(b) in only 15 cases, the number of problematic ovitraps exceeded 10% of the total number of ovitraps in the surveyed area; and

(c) if the percentage of problematic ovitraps was 10% or higher, and if there was sufficient time to carry out the survey again in the relevant areas, the survey would be re-conducted.

### *Problematic ovitraps not properly dealt with*

2.39 The FEHD has instructed frontline staff to report cases of tampering of ovitraps to supervisory staff. In a site visit to observe the handling of ovitraps by FEHD staff, Audit found that problematic ovitraps (which might have been tampered with) were not properly handled by frontline staff (see Case 1 at Appendix F). In Case 1, the problematic ovitraps (see Photographs 8 and 9 for examples) might not have functioned properly. They might also have been tampered with. However, these problematic ovitraps were not reported to the supervisor, contrary to the FEHD's instructions.

**Photographs 8 and 9**

**Examples of problematic ovitraps noted by Audit**

**Photograph 8**

**Ovitrap placed horizontally and was found to be dry**

**Photograph 9**

**Ovitrap laid on the ground and was found to be dry**

*Source: Photographs taken by Audit on 16 May 2014*

2.40 Upon enquiry, the FEHD informed Audit in September 2014 that:

(a) frontline staff responsible for retrieving ovitraps had the knowledge and experience in assessing on the spot the suspected tampering cases that should be reported to their supervisors;

(b) the supervisors would assess the suspected tampering cases to confirm the case; and

(c) the most important thing was for the frontline staff to assess if the function of an ovitrap in attracting the mosquito had been affected.

2.41 Audit considers that while, in general, responsible frontline staff have the relevant knowledge and experience to assess the situation, the risk of human errors still exists. For example, as shown in Case 1 at Appendix F, some of the problematic ovitraps had lost all the water inside. They would no longer serve their intended function in an effective manner (see Photographs 8 and 9). It would not be appropriate to regard these ovitraps as totally normal and treat them as such without notifying the supervisor for further advice. Moreover, as a matter of fact, LegCo has been informed that ovitraps with seals peeled off (broken) would not be used for compiling the OI (see para. 2.35). The frontline staff should have better handled the problematic ovitraps.

## Audit recommendations

2.42 **Audit has *recommended* that the Director of Food and Environmental Hygiene should:**

(a) **keep the geographical coverage of surveyed areas for dengue vector surveillance under regular review, taking account of factors such as public demand for a wider coverage, and risks of outbreak of dengue fever at individual places over the territory;**

(b) **similarly, keep the strategic distribution of ovitraps within the surveyed areas under regular review, so as to locate them in suitable positions representative of the areas being monitored; and**

(c) **step up actions to tackle the increasing number of problematic ovitraps identified. In particular, the FEHD should:**

(i) **investigate into all suspected cases to ascertain if tampering is involved;**

(ii) **assess the adequacy of the FEHD's measures in preventing and detecting problematic ovitrap cases (including tampering of ovitraps);**

(iii) **take effective measures to prevent and detect problematic ovitrap cases (including tampering of ovitraps) in the future; and**

(iv) **remind all staff concerned of the need to properly deal with problematic ovitraps (e.g. reporting cases of problematic ovitraps to supervisory staff, and excluding affected ovitraps from the compilation of the OI).**

## Response from the Administration

2.43 The Director of Food and Environmental Hygiene generally agrees with the audit recommendations. She has said that:

(a) dengue vector surveillance covers areas with high human concentrations such as clusters of residential areas, schools and hospitals as recommended by the WHO. The FEHD will continue to annually review the coverage of the surveyed areas taking into consideration the recommendations of the WHO, development of the city, the transmission of the disease in the past year, the comparability of the surveillance results and the resource implications;

(b) the FEHD will continue to review on a yearly basis the strategic distribution of ovitraps within the surveyed areas taking into consideration relevant factors such as the biology of the vector, the representativeness of the location and the possibility of disturbance of the ovitraps by the public; and

(c) frontline staff responsible for retrieving ovitraps have the knowledge and experience in assessing in the field if the ovitraps have been tampered with and if the function of an ovitrap in attracting mosquitoes has been affected. This notwithstanding, the PCAS will seek to provide more detailed guidelines on handling problematic ovitraps and data adjustment in enumeration of the OI to staff. The PCAS will remind its staff to investigate all problematic cases to ascertain if tampering is involved and remind parties concerned not to interfere with the ovitraps.

## Japanese encephalitis vector surveillance

2.44 JE is a mosquito-borne viral disease in humans and animals. Mosquitoes become infected when feeding on infected animals (mainly domestic pigs and wild

birds), and then transmit the disease to humans. The disease vector is Culex mosquitoes. In recent years, there have been sporadic JE cases reported in Hong Kong, mainly the Tin Shui Wai areas of Yuen Long. In 2014 (up to August 2014), three local JE cases were reported in Hong Kong.

2.45 In September 2013, the FEHD set up the JE vector surveillance programme. Under the programme, samples of mosquitoes are collected in each of the summer months (i.e. April to October) through the use of a trapping device to detect the presence of Culex mosquitoes (Note 16). Findings of JE virus in the samples of Culex mosquitoes found are publicised (Note 17).

2.46 As at June 2014, the FEHD had set up trapping devices at six areas in Yuen Long for JE vector surveillance.

### *Limited coverage of geographical areas for surveillance*

2.47 Audit noted that, apart from the existing JE vector surveillance programme, the FEHD had carried out a territory-wide survey of JE vectors during the period October 2004 to October 2005 (the 2004-2005 Survey).

2.48 Compared with the territory-wide surveillance information of the 2004-2005 Survey, the surveillance information about Yuen Long provided under the existing JE vector surveillance programme is very limited.

2.49 Upon enquiry, the FEHD informed Audit in September 2014 that the 2004-2005 Survey was a one-off territory-wide JE survey. It was for getting baseline information on distribution of JE vectors and JE virus-carrying vectors, piggeries and areas with migratory birds in Hong Kong. The JE vector surveillance programme started in 2013 covering Yuen Long only, because the risk of local transmission of JE in Yuen Long was much higher than other areas:

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**Note 16:** *The species to be monitored is Culex tritaeniorhynchus.*

**Note 17:** *In June 2014, the FEHD detected the virus from Culex mosquitoes collected in Tin Shui Wai. The result was announced.*

(a) of the 10 local human JE cases reported during 2004 to 2013, 7 were from Yuen Long;

(b) of the 3 local JE cases reported during 2014 (up to August 2014), 2 were also from Yuen Long; and

(c) in the 2004-2005 Survey, all the JE vectors that carried JE virus were collected from Yuen Long.

2.50 According to the FEHD, the six areas selected for surveillance at Yuen Long under the existing programme are the high-risk areas. The FEHD has considered such risk factors as proximity of piggeries, aggregation of migratory birds, and previous records of JE vectors.

2.51 In this regard, Audit noted that places outside Yuen Long might also be affected by such risk factors. For example:

(a) ***Piggeries.*** According to the FEHD's latest records, in 2014, there were 46 pig farms/slaughterhouses over the territory. Of these pig farms/slaughterhouses, 12 (26%) were located in districts other than Yuen Long, e.g. Sai Kung and North District;

(b) ***Migratory birds.*** According to information published in 2005 by the Centre for Health Protection of the Department of Health, 40% of wild birds in Hong Kong and 70% of wild birds in Kowloon Park had JE antibodies. A vector mosquito could pick up the JE virus from a wild bird and then transmit it to a human (Note 18); and

(c) ***Previous records of JE vectors.*** As noted in the 2004-2005 Survey, JE vectors were present in many places over the territory outside Yuen Long.

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**Note 18:** *According to the published information, wild birds pose much less danger to humans in the transmission of JE because the total viral mass in birds is far less than that in pigs.*

2.52 As a matter of fact, in August 2014, there was one reported local JE case occurred in Tuen Mun (i.e. outside Yuen Long). Audit considers that the geographical coverage of the JE vector surveillance programme needs to be extended.

## Audit recommendation

2.53 **Audit has *recommended* that the Director of Food and Environmental Hygiene should review the coverage of geographical areas for JE vector surveillance, taking account of the fact that places not currently selected for surveillance could be subject to risk factors (e.g. proximity of piggeries and aggregation of migratory bird) in relation to the disease.**

## Response from the Administration

2.54 The Director of Food and Environmental Hygiene agrees with the audit recommendation. She has said that:

(a) the FEHD will keep in view the risk of local transmission of the disease taking into consideration the recommendation and advice given by the WHO and the Department of Health, and the resource implications; and

(b) the JE vector surveillance would be extended to other areas if necessary.

## Malaria vector surveillance

2.55 Some species of Anopheline mosquitoes are vectors of malaria (Note 19). Under the malaria vector surveillance programme, the FEHD regularly collects samples of mosquitoes and their larvae from potential breeding places along streams

**Note 19:** *The two species confirmed to be malaria vectors in the territory are Anopheles minimus and Anopheles jeyporiensis.*

(Note 20). Analysis is conducted to identify the presence of malaria vectors and their larvae in the samples.

2.56 According to the FEHD's latest records available, in 2014, there were about 5,400 streams in Hong Kong. The FEHD has not laid down a timetable for completing the survey of all these streams. Audit noted that the FEHD had surveyed only 1,625 (30%) streams in the past three years (2011 to 2013). At this pace, a complete survey of all the 5,400 streams would take as long as 10 years.

2.57 One reason for the slow progress of the survey of streams could be the long time taken on larval surveys which involve manual collection of samples of mosquito larvae from stream water. Such surveys are done in addition to the collection of mosquito samples along the streams using mosquito trapping devices.

2.58 Audit reviewed the larval surveys conducted recently during the period January to June 2014. Audit found that the FEHD spent considerable time (155 man-days) in conducting the surveys for 386 streams. Moreover, only a small number of streams (9% of the streams) had larvae of Anopheline mosquitoes, all of which were not malaria vectors (see para. 2.55).

2.59 Audit noted that the last local case of malaria was reported some 14 years ago in 2000, and that the FEHD's surveys had not found malaria vectors and their larvae since 2006. This, together with the results of the recent larval surveys, shows that the risk of locally transmitted malaria in Hong Kong is not high. Audit also noted that, apart from the malaria vector surveillance programme, District Offices of the FEHD had been conducting regular mosquito control work on selected streams (see para. 3.2). The FEHD may need to examine the need for conducting the labour-intensive larval survey for every stream under the malaria vector surveillance programme.

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**Note 20:** *According to the FEHD, malaria vectors usually breed in habitats along streams. Mosquito samples are collected with the aid of a trapping device. Larva samples are collected manually from the stream water.*

2.60 Upon enquiry, the FEHD informed Audit in September 2014 that:

(a) the larval survey was needed for getting information for carrying out effective and efficient targeted vector control and prevention. Given the territory's densely populated condition, local transmission of malaria could be very extensive within a short period of time;

(b) the malaria vector prevention programme being implemented by District Offices was reviewed from time to time taking into consideration the development of the territory; and

(c) not all of the streams needed to be attended to with the same priority in the context of malaria prevention. Work plan with timetable for implementing the malaria vector surveillance programme according to the risk factors of transmission of the disease would be prepared.

## Audit recommendations

2.61 **Audit has *recommended* that the Director of Food and Environmental Hygiene should:**

(a) **continue to critically review the FEHD's strategy for malaria vector surveillance, in parallel with that for malaria prevention, taking into account the latest assessment of the risks of malaria in Hong Kong and the resource implications especially for conducting the labour-intensive larval surveys; and**

(b) **based on the results of the review in (a) above, prepare a work plan with timetable for implementing the malaria vector surveillance programme.**

## Response from the Administration

2.62 The Director of Food and Environmental Hygiene agrees with the audit recommendations. She has said that:

(a) at present, malaria is still a major threat to many parts of the world. Though the last local case of malaria was reported in 2000, sites favourable for the breeding of the two confirmed local malaria vectors can still be found in various parts of the territory. The territory is still under the threat of having local transmission of the disease, and given the high density of our population, it would be very difficult to contain its spread. It is therefore necessary to maintain vigilance, and the FEHD will continue to keep in view the strategy and methodologies for malaria vector surveillance and prevention recommended by the WHO as well as the advice given by the Department of Health. The most effective and efficient vector prevention and control methodology would be adopted; and

(b) the FEHD will prepare a work plan with timetable for implementing the malaria vector surveillance programme taking into account the risk factors of transmission of the disease and resource availability.

## Effectiveness of infestation indicators

2.63 The RIR and the OI are key infestation indicators. LegCo has been informed that the RIR reflects the general situation of rodent infestation in individual districts, and that the OI indicates the extensiveness of the distribution of Aedine mosquitoes in the surveyed area (see para. 2.3).

### *Indicators may not fully reflect the actual situation of pest infestation*

2.64 The FEHD classifies the RIR into 3 levels and the OI into 4 levels with a view to initiating actions accordingly (see Appendix G). However, Audit noted that the RIR and the OI did not always fully reflect the actual situation of pest infestation. Cases 2 and 3 are examples showing that the RIR and the OI might not be in line with the level of infestation as perceived by the general public.

**Case 2**

**Rodent infestation in Sai Kung**
**(2012 and 2013)**

1. For 2012 and 2013, the FEHD recorded a 0% RIR for Sai Kung.

2. Such surveillance information did not seem to be consistent with other FEHD statistics for its rodent control work in Sai Kung, as follows:

| Year | No. of public complaints about rodents in Sai Kung | No. of rodents trapped/poisoned by the FEHD in Sai Kung |
|---|---|---|
| 2012 | 378 | 677 |
| 2013 | 419 | 584 |

***Audit comments***

3. The number of public complaints about rodents and the number of rodents trapped/poisoned in Sai Kung were considerable. The degree of rodent infestation in Sai Kung might not be negligible as the RIR suggested.

*Source: FEHD records*

**Case 3**

**Mosquito infestation in Yuen Long**
**(January to March 2013)**

1. In January and February 2013, the FEHD recorded a 0% OI for Yuen Long Town.

2. On 11 March 2013, at a meeting of the Environmental Improvement Committee of the Yuen Long District Council, Members commented that:

(a) mosquito infestation had remained serious in Yuen Long District. There was recently an increase in the number of public complaints about mosquito infestation in the District; and

(b) there was doubt as to why a 0% OI was recorded.

3. At the meeting, the Members urged the FEHD to ensure that an accurate OI could be obtained.

4. On 25 April 2013, the FEHD announced the OI for March 2013. The figure for Yuen Long Town remained at 0%.

***Audit comments***

5. The OI for an area indicates the extensiveness of the distribution of Aedine mosquitoes in the area (see para. 2.63). According to the FEHD's published information, Aedine mosquitoes are commonly found in Hong Kong. The fact that Yuen Long Town had a 0% OI (i.e. no or negligible number of Aedine mosquitoes) was seemingly at odds with the increasing number of public complaints about mosquito infestation in the District (see para. 2(a) above).

*Source: FEHD records and minutes of Yuen Long District Council meetings*

2.65 Upon enquiry, the FEHD informed Audit in September 2014 that:

(a) regarding Case 2:

(i) the RIR for Sai Kung had been taken from the central area of Tseung Kwan O and mainly from the town of Sai Kung where the population was relatively high;

(ii) the complaints about rodents in Sai Kung District were mainly received from village type houses which scattered widely in the District;

(iii) the village type houses had not been chosen for coverage by the rodent surveillance programme. Such houses were too widely distributed for effective monitoring through the RIR; and

(iv) the FEHD had monitored closely the complaint figures from those areas and conducted regular pest control operations there;

(b) a 0% RIR of a district only indicated that no rodent activities in the surveillance areas had been detected during the survey period (the three days when the monitoring bait was set — see para. 2.5). It did not suggest that there was no rodent activity in the whole district during the whole month;

(c) a 0% OI of a surveyed area indicated that dengue vectors were not detected in that area during the week (see para. 2.28) when the ovitraps were set. It did not indicate that dengue vector was not present in the area in the whole month nor did it indicate that dengue vector was not present outside the surveyed area; and

(d) the RIR and the OI provided only additional information for formulation of pest control strategies and evaluation of the effectiveness of pest control work.

2.66 Notwithstanding the FEHD's explanations (see para. 2.65), Audit considers that there are limitations in the use of the OI and the RIR as key indicators of pest infestation.

2.67 Audit considers that infestation indicators provide important surveillance information for planning and evaluation of pest control work. It is important that the indicators can adequately reflect the level of pest infestation. At present, the indicators are presented as a percentage of the monitoring points with positive results. In general, a 0% infestation rate may give an impression to the public that the number of pests concerned is negligible. However, this might not be in line with public perception of the pest problem, for example, as reflected by number of public complaints and number of rodents trapped/poisoned in the areas concerned. There is a need to review the effectiveness of the infestation indicators in providing surveillance information for pest control.

## Audit recommendations

2.68 **Audit has *recommended* that the Director of Food and Environmental Hygiene should:**

(a) **review the effectiveness of infestation indicators (i.e. the RIR and the OI) in providing surveillance information for planning and evaluation of pest control work, taking account of other relevant information, e.g. public complaints on pest infestation;**

(b) **having regard to the results of the review in (a) above and other relevant factors (e.g. findings in this audit review), review the methodology for the compilation of infestation indicators to improve their representativeness of the level of pest infestation; and**

(c) **consider providing supplementary information to stakeholders (e.g. LegCo and the public) on the limitations of the infestation indicators in representing the general level of pest infestation (see para. 2.65(b) to (d)), so as to avoid misinterpretation by users of the indicators.**

## Response from the Administration

2.69 The Director of Food and Environmental Hygiene generally agrees with the audit recommendations. She has said that:

(a) the objectives of the two indices are to provide additional information on the extensiveness of infestation of rodents and Aedine mosquitoes for formulation of relevant pest control strategies and evaluation of the effectiveness of pest control work. There are no internationally adopted standards and guidelines on the RIR and the OI. Each surveillance method has its strengths and weaknesses;

(b) the FEHD classifies the RIR and the OI into different levels and initiates actions accordingly (see para. 2.64);

(c) the FEHD will continue to keep in view the methods on disease vector surveillance recommended by the WHO and used by other cities. Methods which are suitable for use locally would be adopted for improving the effectiveness of the surveillance methods being used. More detailed guidelines for compilation of the infestation indicators would be prepared for the relevant staff. They would be reminded of the limitations of the infestation indicators, and to take into account public complaints/requests for services on controlling the pest, results of inspection and information obtained from the monitoring/surveillance system in addition to the infestation indicators (RIR and OI) for planning and evaluating the pest control work; and

(d) the FEHD will provide stakeholders including the public with more information on the interpretation and limitations of the infestation indicators when the indicators are released.

# PART 3: PEST CONTROL OPERATIONS

3.1 This PART examines the pest control operations of the FEHD's District Offices, and suggests measures for improvement in the following areas:

(a) planning of pest control work (paras. 3.2 to 3.28);

(b) supervision and performance of pest control work (paras. 3.29 to 3.34); and

(c) monitoring the performance of contractors (paras. 3.35 to 3.46).

## Planning of pest control work

3.2 Through its 19 District Offices, the FEHD carries out pest control operations in public places over the territory (see para. 1.7(b)). A key component of the operations is the conduct of routine pest control work at places such as pavements, flower beds, rear lanes, hill slopes and open areas (Note 21). Routine pest control work is also done at streams, watercourses and other water bodies to prevent and control disease vectors such as malaria vectors (Note 22).

3.3 Pest control staff of District Offices are organised into teams to conduct routine pest control work. The pest control teams are classified into in-house teams

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**Note 21:** *According to the FEHD, particular attention is paid to areas in close proximity to places such as food premises, residential premises, schools, construction sites, illegal cultivation sites, hospitals, waterfront public and private cargo working areas, cross boundary check points and ferry terminals, typhoon shelters, markets/municipal services buildings, hawker bazaars, pig farms and other problematic spots.*

**Note 22:** *Besides routine pest control work, the FEHD also investigates into complaints, takes enforcement actions against mosquito breeding in private premises and construction sites, promotes public awareness in pest control through anti-mosquito campaigns and anti-rodent campaigns, conveys technical advice to the public on proper pest control, and follows up vector-borne disease cases, etc.*

(comprising FEHD staff) and contractor teams (comprising contractor staff — Note 23). Each team serves specific geographical areas. As at June 2014, the 19 District Offices had a total of 95 in-house teams and 274 contractor teams. On average, each District Office had 5 in-house teams and 14 contractor teams. Each team had about 6 members.

## *Audit visits*

3.4 From May to July 2014, Audit visited four District Offices (Note 24), namely Eastern District Office (District Office A), Sham Shui Po District Office (District Office B), Sai Kung District Office (District Office C) and Yuen Long District Office (District Office D). Audit reviewed their planning and conduct of routine pest control work.

3.5 To obtain first-hand information about the pest control practices of the four District Offices, Audit also conducted inspection visits to sites where pest control work was done, as follows:

(a) ***Accompanied visits.*** Audit staff visited different pest control teams when they were on duty, covering the work of both in-house and contractor pest control teams of the four District Offices. A total of 10 visits were conducted (Visit-1 to Visit-10 — Note 25); and

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**Note 23:** *Contractor staff provide services under pest control contracts. As at June 2014, there were a total of 20 pest control contracts, involving seven contractors (see para. 3.35).*

**Note 24:** *The District Offices were selected from the four regions, namely, Hong Kong and Islands, Kowloon, New Territories (East), and New Territories (West).*

**Note 25:** *On 12 and 14 May 2014, Audit staff conducted the first two accompanied visits to pest control teams of District Office A. This round of visits helped Audit familiarise with the operations of pest control teams. Thereafter, for each of the four District Offices, Audit selected an in-house pest control team and a contractor pest control team for visit during the period 26 May to 30 June 2014. Audit visited each team for one day covering their working hours.*

(b) ***Independent visits.*** On some occasions, Audit staff conducted inspection visits on their own to observe the results of the District Offices' pest control work (Note 26).

## *Areas for improvement in planning of pest control work*

3.6 Pest control teams patrol their responsible areas according to a planned schedule (inspection programme). The inspection programme specifies the locations (e.g. specific rear lanes and streets) to be patrolled each day. During the patrol, the pest control team carries out pest control operations, such as clearing stagnant water, applying pesticides, and replacing rodenticides. District Offices are responsible for formulating inspection programmes for their own pest control teams (Note 27).

3.7 Audit examined a sample of weekly inspection programmes for the four District Offices, and found that the District Offices had largely been using the same set of programmes for at least three years (Note 28). Upon enquiry, the District Offices informed Audit (from May to July 2014) that the current set of inspection programmes had generally been used for a long time. The basis for formulating the programmes in the first place could not be traced.

3.8 According to FEHD guidelines, the inspection programmes should be worked out on a weekly basis. However, the guidelines gave no clear instructions on how the inspection programmes should be formulated taking account of relevant information (e.g. infestation indicators, complaints and blackspots).

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**Note 26:** *Some inspections were conducted outside the normal working hours of pest control teams.*

**Note 27:** *In practice, each pest control team prepares its inspection programme for approval by the District Office.*

**Note 28:** *For the four District Offices, Audit selected the inspection programmes of the pest control teams (8 in-house teams and 30 contractor teams) for one week in each of the years 2012 to 2014. Audit compared the inspection programs for each team and found that, in general, no changes had been made to the programmes over the three-year period.*

3.9 Audit visits had revealed a number of inadequacies in the planning of pest control work (see paras. 3.10 to 3.21). There is a need for the FEHD to provide adequate guidelines so as to help District Offices formulate more effective inspection programmes.

### *Uneven workloads of pest control teams on site*

3.10 Audit noted two contrasting cases during Visit-3 on 26 May 2014 and Visit-8 on 5 June 2014. In one case, the pest control team (an in-house team) completed its inspection programme by conducting 1.3 hours of on-site pest control work. In the other case, the pest control team (a contractor team) conducted some 7 hours of on-site work for completing the scheduled pest control work. Table 8 shows the different workloads of the two inspection programmes.

**Table 8**

**Time spent on two inspection programmes**
**(District Offices A and B)**

| | **Visit-3** | **Visit-8** |
|---|---|---|
| Pest control team | In-house (District Office A) | Contractor (District Office B) |
| Date of the inspection programme/visit | 26 May 2014 | 5 June 2014 |
| Work areas for patrolling and pest control | Specific areas/streets around Causeway Bay | Specific areas/streets around two housing estates in Sham Shui Po |
| ***Time spent*** | | |
| Patrolling and conducting pest control work at the work areas | 1.3 hours (15%) | 7 hours (87%) |
| Ancillary work (e.g. preparatory work and travelling between work areas) | 3.9 hours (43%) | 1 hour (13%) |
| Office work | 3.8 hours (42%) | 0 hour (0%) |
| Total (Note) | 9 hours (100%) | 8 hours (100%) |

*Source: Audit visits on 26 May 2014 and 5 June 2014*

*Note: The normal working hours of the in-house staff were 9 hours a day (from 8:00 a.m. to 6:00 p.m., including a one-hour lunch break). The working hours of the contractor staff were 8 hours a day (from 8:00 a.m. to 5:00 p.m., including a one-hour lunch break).*

3.11 Audit noted that the in-house team spent considerable time (42% of the working hours — see Table 8) at the FEHD office, and on walking between work areas (some 40 minutes). Upon enquiry, the FEHD informed Audit in September 2014 that:

(a) carrying pesticides, which are toxic and hazardous, on public transport is prohibited. Government vehicles or hired vehicles should be the means of transportation in such circumstances. While each pest control team of contractors is provided with a vehicle for driving to the work sites direct, the vehicles for in-house pest control teams are for share use among the teams; and

(b) as regards the office work, in-house pest control teams are led by supervisors who are usually a staff member of the FEHD Foreman rank. Unlike contractor staff whose duties are mainly on pest control field work, these in-house supervisors are also required to perform other duties (e.g. administrative work, law enforcement duties, investigation of complaints, and preparing reports on pest control survey conducted).

3.12 In this regard, Audit noted that during Visit-3 on 26 May 2014, the FEHD had hired a motor vehicle to carry the in-house pest control team to work. However, for most of the time, the vehicle was parked at the roadside and was not used for conveying the pest control team between work areas.

3.13 As for the office work, Audit noted that the four members (other than the supervisor) of the in-house pest control team were workmen who were primarily field workers. Requiring all four workmen to spend substantial (42%) time at the FEHD office to support their supervisor's other duties, which included administrative and reporting work (see para. 3.11(b)), might not constitute efficient deployment of staff resources. In this regard, the contractor team whose team members (also workers) spent the vast majority of their time on on-site pest control work. Moreover, Audit found no documentary records of the specific office work done by the four in-house workmen on that day. The FEHD needs to explore ways of making better use of its staff resources in conducting pest control work.

### *Construction sites not covered by inspection programmes*

3.14 Construction sites are potential mosquito breeding grounds and may provide harbourage for rodents. The FEHD internal guidelines require that inspection programmes should cover all construction sites in the work areas.

3.15 During Visit-9 on 23 June 2014, the pest control team of District Office D conducted patrol according to the inspection programme. Audit noted that the team bypassed some construction sites en route. Audit recorded the details of three sites for follow-up purposes (see para. 3.16). Photograph 10 shows one of these sites.

**Photograph 10**

**A construction site bypassed by the pest control team (23 June 2014)**


*Source: Audit visit conducted on 23 June 2014*

3.16 Audit noted that the inspection programme made no mention of any construction sites. Upon enquiry, District Office D informed Audit in June 2014 that, as in other District Offices, District Office D had maintained a control list of construction sites within its responsible areas. Audit was also informed that inspections could be conducted according to the list where necessary. However, Audit reviewed the list and could not find details of the three construction sites recorded earlier (see para. 3.15).

3.17 Upon enquiry, the FEHD informed Audit in September 2014 that it had reminded District Offices to keep an updated list of construction sites or fenced-off vacant sites in their districts. Pest control staff were reminded to:

(a) proactively take note of any new construction sites or fenced-off vacant sites during their work, and report to their supervisors for updating the list of construction sites or fenced-off vacant sites. The supervisor should verify the land status of these sites with the departments concerned where necessary; and

(b) incorporate the construction sites or fenced-off vacant sites in the inspection programmes.

### *Inadequate coordination with street cleansing activities*

3.18 Apart from pest control services, District Offices are also responsible for the provision of services such as street cleansing. Manual sweeping and street washing are conducted from time to time.

3.19 During the visits to the four District Offices, Audit noted cases in which street washing was conducted shortly after the completion of routine pest control work. Table 9 shows examples of such cases in the weekly pest control work and street washing schedules for June 2014.

**Table 9**

**Routine pest control work and street washing for selected locations (June 2014)**

| District Office | Location | Time for conducting | | Time lapse between pest control work and street washing (Day) |
|---|---|---|---|---|
| | | Routine pest control work | Street washing | |
| A | Cloud View Road | Tuesday | Wednesday | 1 |
| A | Wing Hing Street | Wednesday | Thursday | 1 |
| A | Ngan Mok Street | Wednesday | Friday | 2 |
| C | Housing estate X | Wednesday | Thursday | 1 |
| C | Housing estate Y | Wednesday | Thursday | 1 |

*Source: Audit analysis of FEHD records*

3.20 Routine pest control work is conducted according to inspection programmes. Such work requires pest control teams to replace rodenticides and apply pesticides in public places (see para. 3.6). Audit considers that, to avoid the freshly applied rodenticides and pesticides from getting wet (rendering them ineffective) or being washed away during street washing, District Offices should better dovetail their inspection programmes with street washing schedules. For example, it is more desirable to conduct routine pest control work for a location right after street washing, but not the other way round. The existing arrangements (see Table 9 for examples) are less than satisfactory.

3.21 Upon enquiry, the FEHD informed Audit in September 2014 that it had reminded pest control staff of District Offices to enhance the coordination between the pest control work and other street cleansing activities (e.g. street washing) of the FEHD.

## *Control and disinfestation work on nuisance pests*

3.22 In the four District Offices visited by Audit, the inspection programmes did not specify the type of routine pest control work to be done at each work area (e.g. control of rodents, mosquitoes or other pests). Upon enquiry, the District Offices informed Audit in June and July 2014 that the inspection programmes were primarily for controlling disease vectors, mainly rodents and mosquitoes. For nuisance pests (e.g. cockroaches) which caused irritation rather than serious illness, preventive and control measures were not conducted regularly. The District Offices generally acted on complaints to conduct disinfestation exercises for nuisance pests.

3.23 Audit noted that the four District Offices received many complaints about nuisance pests (1,617 complaints in 2013), and that many disinfestation exercises were conducted on nuisance pests. In particular, District Office D conducted 9,547 disinfestation exercises for nuisance pests in 2013 (see Table 10).

**Table 10**

**Disinfestation exercises for nuisance pests conducted by selected District Offices (2013)**

| District Office | Number of disinfestation exercises |
|---|---|
| A | 112 |
| B | 52 |
| C | 500 |
| D | 9,547 (Note) |
| Total | 10,211 |

*Source: FEHD records*

*Note: Of these exercises, 8,823 were targeted at flies.*

3.24 Upon enquiry, the FEHD informed Audit in September 2014 that, of the 8,823 disinfestations operations conducted by District Office D on flies (see Note to Table 10), 8,810 operations were carried out under a regular programme at refuse collection points, bin sites and aqua privies.

3.25 In this connection, Audit notes that, in response to public concerns about bedbug infestation in public places, the FEHD has recently introduced routine pest control work for bedbugs (Note 29). Under the enhanced practices, the FEHD will carry out regular pest control programmes against bedbugs in refuse collection points and public places (e.g. applying insecticides to discarded furniture pending removal at refuse collection points).

3.26 Audit welcomes the FEHD's initiatives in preventing and controlling bedbugs (see para. 3.25) and flies (see para. 3.24) in a planned manner. Any unplanned disinfestation exercises for nuisance pests could disrupt District Offices' routine pest control work. The sporadic conduct of any unplanned disinfestation exercises might also not be able to fully meet public expectations. Audit considers that, to better meet public expectations and to further reduce any disruption on routine pest control work, the FEHD may need to continue exploring the desirability of incorporating into its inspection programmes further preventive and control measures for other nuisance pests.

## Audit recommendations

3.27 **Audit has *recommended* that the Director of Food and Environmental Hygiene should take measures to improve the FEHD's planning of pest control work. In particular, the FEHD should:**

(a) **provide adequate guidelines to help District Offices regularly update their inspection programmes, taking into account relevant information (e.g. infestation indicators, complaints and blackspots);**

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**Note 29:** *In October 2013, a LegCo Member expressed concern about the increasing bedbug problems in public places. The FEHD has subsequently required District Offices to enhance their bedbug disinfestation measures.*

(b) **ensure more efficient and cost-effective deployment of staff resources for pest control work by:**

(i) **evening out the workloads among different inspection teams;**

(ii) **reducing the time spent by pest control field workers at the office;**

(iii) **making better use of motor vehicles for conveying pest control staff between work areas in conducting routine pest control work; and**

(iv) **specifying clearly in the inspection programmes details of the pest control work to be conducted;**

(c) **take measures to incorporate the checking of potentially problematic sites (e.g. construction sites) into the inspection programmes;**

(d) **ensure that the coordination between the pest control work and other street cleansing activities (e.g. street washing) of the FEHD are enhanced, with a view to reducing the risk of hampering the effectiveness of rodenticides and pesticides applied in public places; and**

(e) **consider devising preventive and control measures for more nuisance pests where appropriate, and incorporating them into routine pest control work under the inspection programmes.**

## Response from the Administration

3.28 The Director of Food and Environmental Hygiene agrees with the audit recommendations. She has said that:

(a) the FEHD will review and provide appropriate guidelines setting out the relevant benchmarks to help District Offices regularly update their inspection programmes and specify clearly, in the inspection programmes, details of the pest control work to be conducted;

(b) the FEHD will remind District Offices to ensure more efficient and cost-effective deployment of staff resources for pest control work by evening out the workloads of different pest control teams, reducing the time spent by in-house pest control workers at the office and making better use of motor vehicles for conveying pest control staff between work areas in conducting routine pest control work. In general, the supervisors of pest control teams are responsible for the supervision of fieldwork and other administrative duties after they return to office;

(c) the District Offices completed a special round of checking in September 2014. All the construction sites and fenced-off sites have been incorporated in the regular inspection programmes;

(d) the FEHD has reminded pest control staff of District Offices to enhance the coordination between the pest control work and other street cleansing activities (e.g. street washing) of the FEHD;

(e) the FEHD's resource is focused on the control of pests with public health significance (e.g. mosquitoes and rodents). Nuisance pests such as cockroaches, ants and bedbugs are closely related to environmental hygiene conditions of individual premises. Complaints of nuisance pests mainly arose from the privately occupied portions of the premises. Under the Public Health and Municipal Services Ordinance, it is the responsibility of the owners or occupiers to maintain their premises free from vermin infestation; and

(f) in response to complaints about nuisance pests, District Offices will provide technical advice to the owners or occupiers concerned and conduct relevant pest control work in public areas. The FEHD will continue to monitor the ground situation and where circumstances so warrant, incorporate preventive and control measures for other nuisance pests in public places under the regular inspection programmes.

## Supervision and performance of pest control work

3.29 A typical pest control team has 5 or 6 members (1 supervisor with 4 or 5 workers). For in-house pest control teams, the supervisor is usually a staff member of the Foreman rank. For contractor pest control teams, the supervisor is

an employee of the contractor. According to FEHD guidelines, in-house supervisors are not required to supervise contractor staff. The in-house supervisors and contractor supervisors are responsible for leading their own teams (see paras. 3.35 to 3.46 for the FEHD's practices in monitoring contractor performance).

### *Improper work practices of pest control teams*

3.30 Audit conducted accompanied visits and independent visits to observe pest control work of the four District Offices (see para. 3.5). The visits revealed areas where improvements could be made in the performance of the pest control work. Improper work practices of the pest control teams (see Table 11 for details) included:

(a) using improper gear at work by individual staff (see item 1 of Table 11);

(b) failing to remove potential mosquito breeding sources (see Photograph 11 and item 6 of Table 11);

(c) improper handling of rodenticides (see Photograph 12 and items 3 to 5 of Table 11);

(d) failing to conduct pest control work by individual staff (see item 2 of Table 11);

(e) improper handling of trapped rodents (see item 7 of Table 11); and

(f) failing to set rodent traps properly (see item 8 of Table 11).

**Table 11**

**Performance of individual pest control workers**
**(May to August 2014)**

| Item | Date of audit visit | In-house/ contractor staff | Observed performance | Detail |
|---|---|---|---|---|
| 1 | 14.5.2014 (Visit-2) | In-house | Using improper gear at work | (a) a worker collected a dead rodent with cotton gloves instead of plastic/rubber gloves as required by the FEHD.<br>(b) a worker did not put on gloves and goggles when spraying pesticides, contrary to the FEHD's recommended practice. |
| 2 | 26.5.2014 (Visit-4) | Contractor | Failing to conduct pest control work by individual staff | (c) a pest control worker was also responsible for driving the motor vehicle which carried the pest control team. The worker did not conduct pest control work as required by the service contract, but stayed with the car at the roadside. The worker explained that the car was not parked at a proper parking space. |
| 3 | 26.5.2014 (Visit-4) | Contractor | Placing rodenticides inappropriately | (d) a rodenticide bait was hung on a fence, high above the ground. The position might not be accessible to rodents. |
| 4 | 30.5.2014 (Visit-5) | In-house | Placing rodenticides inappropriately | (e) rodenticide pellets were unpacked and placed on the ground in a rear lane. The place was accessible to other people (including children) and domestic animals (e.g. dogs and cats) (see Photograph 12). |

**Table 11 (Cont'd)**

| Item | Date of audit visit | In-house/ contractor staff | Observed performance | Detail |
|---|---|---|---|---|
| 5 | 3.6.2014 (Visit-7) | Contractor | Failing to replace rodenticides | (f) when the pest control team finished their work, the contents of a bait box (a box for holding baits, with openings for access by rodents) had not been checked. At Audit's request, the team opened the bait box and found that the bait had turned bad. It was not until then the team replaced the bait. |
| 6 | 23.6.2014 (Visit-9) | In-house | Failing to remove potential mosquito breeding sources | (g) workers picked up receptacles (e.g. discarded bottles and paper cups) along the road and emptied the water inside. Although the receptacles could again gather water (e.g. rainwater) for mosquito breeding, the workers put back the receptacles on the ground (see Photograph 11). The workers should have taken away the receptacles for disposal. |

**Table 11 (Cont'd)**

| Item | Date of audit visit | In-house/ contractor staff | Observed performance | Detail |
|---|---|---|---|---|
| 7 | 12.5.2014 (Visit-1)<br><br>14.5.2014 (Visit-2)<br><br>26.5.2014 (Visit-4)<br><br>3.6.2014 (Visit-7)<br><br>30.6.2014 (Visit-10) | Contractor and In-house | Alleged drowning of trapped rodents | (h) From time to time, live rodents were trapped (in cage traps) by pest control teams. Upon enquiry, workers informed Audit that many colleagues did not kill the trapped rodents by breaking their necks as specified in the FEHD guidelines. Rather, it was a common knowledge that workers drowned the rodents for convenience (e.g. using a large polystyrene container). This was an inhumane treatment not allowed by the FEHD. |
| 8 | 11.6.2014 (Independent visit)<br><br>4.8.2014 (Independent visit) | Contractor | Failing to set rodent traps properly | (i) On each day, Audit visited two rear lanes shortly after rodent traps (cage traps) were set by pest control workers. Audit found that:<br><br>(i) none of the cage traps were set according to the FEHD guidelines. The guidelines required that each cage trap should be placed at right angle to the vertical surface of the wall in the rear lane, and that the opening of the cage trap should be facing the vertical surface of the wall. In the event, the cage traps were scattered along the rear lane, in a disorganised manner; and |

**Table 11 (Cont'd)**

| Item | Date of audit visit | In-house/ contractor staff | Observed performance | Detail |
|---|---|---|---|---|
| | | | | (ii) according to records of the responsible office (District Office B), in 3 of the rear lanes, a total of 40 cage traps should be set (15, 15 and 10 cage traps respectively). However, Audit found that only 24 cage traps had been set (10, 6 and 8 cage traps respectively). |

*Source: Audit visits during May to August 2014*

**Photograph 11**

**Receptacles which could gather water for mosquito breeding were not removed from the site (June 2014)**

**A receptacle (paper cup)**

*Source: Audit visit conducted on 23 June 2014*

**Photograph 12**

**Rodenticide pellets unprotected from moisture and access of domestic animals and children (May 2014)**

**Rodenticide pellets**

*Source: Audit visit conducted on 30 May 2014*

3.31 Audit considers that the above-mentioned areas for improvement were generally related to the inadequate performance and supervision of pest control workers. In this connection, Audit noted in 2 (20%) of the 10 accompanied visits that the supervisors did not adequately supervise the pest control teams. There is a need for the FEHD to take measures to strengthen the supervision of its pest control workers. To improve the accountability of the supervisors of pest control teams, there is a need for them to record their work for management review.

3.32 In this connection, Audit noted that supervisors of in-house pest control teams were also responsible for other duties (e.g. administrative work, law enforcement duties, and investigation of complaints — see para. 3.11(b)). According to FEHD guidelines, in-house supervisors were required to record their work activities daily in an official log. Upon enquiry, District Offices B and D informed Audit in May and July 2014 that they had only used the log for recording law enforcement activities.

## Audit recommendations

3.33 **Audit has *recommended* that the Director of Food and Environmental Hygiene should:**

(a) **review the adequacy of the supervisory practices of pest control teams, with a view to improving the performance of pest control staff, particularly in areas such as clearing of potential mosquito breeding places, application of rodenticides and handling trapped rodents in a proper manner;**

(b) **having regard to the results of the review in (a) above, take effective measures to ensure that pest control workers are adequately supervised; and**

(c) **remind supervisors of in-house pest control teams to properly record their work activities in a daily log for management review.**

## Response from the Administration

3.34 The Director of Food and Environmental Hygiene agrees with the audit recommendations. She has said that the FEHD:

(a) has reminded District Offices to strengthen the supervision of the work performance of the in-house pest control workers and the pest control teams of the contractors;

(b) will review the contract clauses of the outsourced pest control services and, where appropriate, consider imposing heavier sanction on contractors for substandard performance; and

(c) has also reminded supervisors of in-house pest control teams in District Offices to properly record their work activities for management review.

## Monitoring the performance of contractors

3.35 It is an established practice of the FEHD to contract out pest control services to private service providers. As at June 2014, of the 2,419 staff who delivered the FEHD's pest control services, 1,644 (68%) were staff of contractors. The pest control services were delivered under 20 contracts, each covering a specific geographical area (e.g. Kwai Tsing, Tai Po and Tsuen Wan). The 20 pest control contracts (in operation as at June 2014) were awarded to seven contractors at a total price of some $530 million (Note 30).

3.36 Through outsourcing, the FEHD intends to improve existing services and attain better cost-effectiveness. As stated in the FEHD's operational manual for management of pest control contracts, the main objectives in outsourcing include:

(a) improving existing services and meeting increasing demands and new service requirements;

(b) attaining better cost-effectiveness and efficiency;

(c) increasing the flexibility in coping with fluctuating demands; and

(d) gaining access to new skills and technology in the market place.

3.37 Under the pest control contracts, staff of service providers carry out pest control work for the FEHD. As at June 2014, 1,644 contractor staff were involved in the day-to-day pest control work over the territory (see para. 3.35). Through its District Offices, the FEHD monitors and assesses the performance of the contractors.

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**Note 30:** *The 20 pest control contracts were procured through open tendering exercises. For tendering purposes, the 20 contracts were grouped into 5 clusters. There were 4 contracts per cluster (e.g. Yau Tsim, Shum Shui Po, Mong Kok and Kowloon City formed a cluster). Service providers were allowed to tender for any number of contracts, whether within a cluster or in more than one cluster. In order to avoid over-reliance on one or more dominant contractors, the FEHD would award to each contractor not more than one contract in each cluster.*

3.38 The FEHD has laid down service requirements which are binding on the contractors, namely, job-based requirements (e.g. number of staff, working hours, and tasks to be conducted) and performance-based requirements such as:

(a) on completion of the pest disinfestation work, the location concerned should be free from signs of activity of the pest (e.g. egg cases and live pests); and

(b) the effectiveness of disinfestation work should be assessed by objective indicators such as the RIR, the rat-flea index and the OI (see para. 2.3).

3.39 For contractors who fail to meet the service requirements, the FEHD would take various actions depending on the gravity of the matter. For example, the FEHD could require contractors to rectify the situation and issue to them a notice of default in performance (default notice — Note 31). In case of serious breach of service requirements, the Government could terminate the pest control contract.

## *Lack of performance standards*

3.40 The RIR and the OI are important outcome indicators for pest control work. Under the pest control service contracts, it is one of the service requirements that the effectiveness of mosquito/rodent/pest disinfestation work shall be assessed by objective indicators (e.g. rat-flea index, OI and pest infestation rate), and that the FEHD shall have the discretion to decide whether the effectiveness of mosquito/rodent/pest control work has been achieved. However, the FEHD has not specified the standard level of OI and RIR which contractors have to attain.

3.41 Upon enquiry, the FEHD informed Audit in September 2014 that it was not always practicable to use the OI as a performance indicator for contractors, because:

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**Note 31:** *Issuance of a default notice will cause the contractor's contract payments to be reduced. The default notice will be taken into account should the contractor bid for pest control contracts in the future.*

(a) the contractors were responsible for providing mosquito/rodent and other pest control services in public places under the purview of the FEHD; and

(b) some ovitaps or monitoring baits were set in areas outside public places (Note 32).

3.42 In this connection, Audit notes that it is the intention of the FEHD to manage its pest control contracts by results (Note 33). Audit considers it important that performance standards are clearly set, against which results of the pest control contracts can be measured.

### *Field inspections to assess contractor performance*

3.43 Staff of District Offices conduct field inspections to assess contractor staff's day-to-day performance. The FEHD requires that the inspections should be conducted on a random (surprise) basis.

3.44 During the visits to the four District Offices (see para. 3.4), Audit reviewed their inspection records (Note 34). Audit found that the District Offices usually did not conduct field inspections before 9:30 a.m., or after 4:05 p.m. A team of contractor staff informed Audit that they were well aware of the District Office's pattern of conducting daily field inspections. In this connection, Audit's site inspections in May and June 2014 (see paras. 3.30 to 3.32) revealed some cases in which contractor staff might not have followed the service requirements.

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**Note 32:** *Such areas fall within the management responsibility of other parties (e.g. other government departments (see para. 4.5) or private owners).*

**Note 33:** *As stated in its operational manual for management of pest control contracts, the FEHD has adopted the guiding principle of "management by results" in the management of pest control service contracts.*

**Note 34:** *Audit reviewed the latest available records of inspections conducted during the fourth week of June, namely, from 23 to 28 June 2014.*

## Audit recommendations

3.45 **Audit has *recommended* that the Director of Food and Environmental Hygiene should:**

(a) **review the adequacy of performance standards for pest control services provided by contractors;**

(b) **provide guidelines to help District Offices set performance standards against which the results of contractors' pest control work can be measured, taking account of relevant parameters (e.g. OI and RIR) which are applicable to the contractors' work; and**

(c) **remind staff to strictly follow the FEHD's requirements on the conduct of field inspections. In particular, inspections should be conducted on a random basis, in order to ensure that pest control work conducted by contractors at different times of the day will have a fair chance of being assessed.**

## Response from the Administration

3.46 The Director of Food and Environmental Hygiene agrees with the audit recommendations. She has said that the FEHD:

(a) will review the performance standards for pest control services provided by contractors and, where appropriate, provide further guidelines on performance standards, including inspection findings, to help District Offices assess the contractor's pest control work; and

(b) has reminded District Offices to strictly follow the requirements in conducting field inspections and to conduct the inspections on a random basis, covering the whole period of the working hours, to ensure that pest control work conducted by contractors at different times of the day will have a fair chance of being assessed.

# PART 4: PROMOTION OF PEST CONTROL AND ENVIRONMENTAL HYGIENE

4.1 This PART examines the FEHD's efforts in promoting pest control and environmental hygiene.

## Community involvement in pest control

4.2 In pest control, prevention is more effective than disinfestation. According to the WHO's advice, there is always a need for community involvement in implementing environmental management measures for pest control. Under the FEHD's integrated approach to controlling pests (see para. 1.7), emphasis is put on continuous improvement in environmental hygiene as well as on other pest control measures.

### *Publicity and public education on pest control*

4.3 The FEHD makes use of a wide range of channels for publicity and public education to promote pest control and environmental hygiene. Such channels include the FEHD's website, posters, leaflets and TV/radio announcements in the public interest. The FEHD also organises publicity events, such as roving exhibitions at shopping malls of housing estates, health talks, and theme exhibitions.

### *Engaging venue managers and other stakeholders in pest control*

4.4 The FEHD only conducts pest control and preventive work in public places which do not have a venue manager (e.g. clearing stagnant water at roadsides and destroying rat holes on hill slopes). It is the responsibilities of other stakeholders (e.g. other government departments and private owners) to keep their own venues hygienic and prevent pest infestation. To help engage the venue managers in pest control, the FEHD provides pest surveillance information to them to heighten their awareness of pests as disease vectors (see paras. 4.5 to 4.10). To sustain the stakeholders' pest control efforts, the FEHD regularly organises pest control campaigns.

## Provision of pest surveillance information to stakeholders

4.5 The FEHD publicises regularly the RIR and the OI for public information. To enable government departments to better respond to the infestation situations at places under their purview, the FEHD proactively provides details of the two indicators (i.e. the RIR and the OI by areas) to 20 government bureaux/departments (user departments — Note 35). Such user departments include the Agriculture, Fisheries and Conservation Department (AFCD), the Education Bureau (EDB), the Housing Department, and the Leisure and Cultural Services Department (LCSD).

### *Inadequate surveillance information for user departments*

4.6 As mentioned in paragraphs 2.7 to 2.11 and 2.29 to 2.32, the RIR and the OI have an insufficient geographical coverage. Details are as follows:

(a) ***RIR.*** As at June 2014, of a total of 2,240 bait points set up over the territory for rodent surveillance, 184 (8%) were set up at venues of user departments. Monitoring baits were placed at the bait points to detect the presence of rodents for compiling the RIR. Many venues of the user departments were not covered by bait points. For example:

(i) ***AFCD and EDB.*** No bait points were set up at venues of the AFCD and the EDB; and

(ii) ***LCSD.*** Only 25 bait points were set up for the Department, covering 11 (0.7%) of the 1,552 parks and gardens; and

**Note 35:** *These 20 user departments are members of the Interdepartmental Working Group on Pest Prevention and Control, which is an advisory body that helps the Department of Health execute its health functions in relation to prevention and control of infectious diseases.*

(b) ***OI.*** As at June 2014, of a total of 2,371 ovitraps set up over the territory, 1,039 (44%) were set up at venues of user departments. The ovitraps detected the larval breeding rate of dengue fever vectors for compiling the OI. However, many venues of the user departments did not have an ovitrap. For example:

(i) ***AFCD.*** Only 1 ovitrap was set up for the AFCD, which was located at the Hong Kong Wetland Park. No other ovitraps were set up at visitor facilities (e.g. camp sites and barbecue sites) of the AFCD's 46 country parks/special areas;

(ii) ***EDB.*** Of the 1,083 primary and secondary schools over the territory (Note 36), only 178 (16%) had ovitraps (188 in total) set up by the FEHD; and

(iii) ***LCSD.*** Of the 1,552 parks and gardens under the purview of the LCSD, 163 (11%) had ovitraps (223 in total) set up by the FEHD. In particular, no ovitraps were set up at such major parks as the Victoria Park and the Hong Kong Park.

4.7 Audit considers that the RIR and the OI could only provide limited pest surveillance information relating to venues of user departments.

## *Lack of interest in the Rapid Alert System*

4.8 In 2011, the FEHD introduced a Rapid Alert System for the OI. Under the system, when the OI for an area reaches 20%, the FEHD will immediately and specifically alert the system's subscribers (e.g. management offices of residential premises in the area — Note 37) to the high OI. This helps engage stakeholders in the community in taking timely measures for mosquito prevention and control. Apart from alerting subscribers who are usually management offices of residential premises, the FEHD will also invite them to post up pre-designed alert notices in

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**Note 36:** *The figure comprised 569 primary schools and 514 secondary schools (including international schools) for the 2013-14 school year.*

**Note 37:** *Other users include venue managers of schools and construction sites.*

communal areas of the premises. This is to draw people's attention to the need for prompt preventive and control measures for mosquito infestation. Subscription for the system is free.

4.9 As at June 2014, the FEHD had sent out 6,394 invitations to relevant parties (e.g. management offices of residential premises — see para. 4.8) in the 44 areas covered by the OI (see para. 2.29) to subscribe for the Rapid Alert System. Only 812 (13%) of them subscribed for the system. The response rate was not high. Audit noted that there were no subscribers in one area.

4.10 The lukewarm interest in the Rapid Alert System was not encouraging. Audit noted that, even for some areas with high OIs, the number of subscribers was low. For example, the OI of Sai Kung Town had reached a high of 32% in May 2013 (see item 26 of Appendix E), but there were only 4 subscribers. The FEHD needs to review the effectiveness of the Rapid Alert System. It also needs to explore other more effective means of providing timely alerts to stakeholders (e.g. making use of the social media for disseminating the alert information).

## Audit recommendations

4.11 **Audit has *recommended* that the Director of Food and Environmental Hygiene should:**

(a) **in consultation with the relevant user departments, review the adequacy of the pest surveillance information currently provided to them for assessing the pest infestation situations of venues under their purview;**

(b) **take measures to improve the surveillance information provided to other departments for pest prevention and control purposes;**

(c) **critically review the effectiveness of the Rapid Alert System for engaging stakeholders in pest control; and**

(d) **explore more effective means of providing timely alerts to stakeholders and the general public (e.g. making use of the social media in disseminating the alert information) about the need to step up efforts in pest control (e.g. at times of severe mosquito infestation).**

## Response from the Administration

4.12 The Director of Food and Environmental Hygiene generally agrees with the audit recommendations. She has said that the FEHD:

(a) will consult the stakeholders with a view to refining the pest infestation information currently provided to them, although the FEHD has not received any comments from the relevant departments that such information is inadequate; and

(b) will seek comments and suggestions from subscribers of the Rapid Alert System and seek to improve the effectiveness of the system, taking into consideration resource availability. Invitations will be made to all target groups again to enhance their understanding of the significance and usefulness of the information with a view to increasing the number of subscribers.

4.13 The Director of Agriculture, Fisheries and Conservation has said that the AFCD shall be pleased to work with the FEHD to review the adequacy of the pest surveillance information currently provided to the AFCD for assessing the pest infestation situations of venues under its purview.

4.14 The Director of Leisure and Cultural Services has said that the LCSD will continue to work closely with the FEHD to enhance the measures for prevention and control of rodents and mosquitoes in the venues under the management of the LCSD.

# PART 5: WAY FORWARD

5.1 This PART explores the way forward for the FEHD's provision of pest control services.

## Strategy on pest control

5.2 The FEHD is the Government's advisor on pest control matters. The Director of Food and Environmental Hygiene is the designated authority in the control of vermin infestation and mosquito breeding. In discharging its duties, the FEHD has all along been focusing its pest control services on pests which pose a threat to human health, in particular, rodents and mosquitoes which are major disease vectors (see paras. 1.2 to 1.4).

### *Wide variety of pests affecting human health*

5.3 Apart from rodents and mosquitoes, many other pests could pose a threat to human health. For example, according to overseas experiences:

(a) ***Cockroaches.*** Cockroaches can transport micro-organisms on their body surfaces to humans. Cockroaches have been implicated in the spread of different kinds of bacteria, parasitic worms and human pathogens. Certain proteins found in cockroach faeces, saliva and body parts could also cause allergic reactions or trigger asthma symptoms, especially in children;

(b) ***Flies.*** Similar to cockroaches, flies have been known to carry disease-causing germs which are potentially dangerous to humans;

(c) ***Stinging insects.*** Insects such as wasps and hornets can give painful stings. Some stinging insects can also sting repeatedly and the venom can cause allergic reactions in humans; and

(d) ***Ticks.*** Dogs and rats may carry ticks on their bodies. Ticks can be vectors of spotted fever which is mainly transmitted through their bites. Infection can also occur when crushed tissues or faeces of the infected ticks get into breaks in human skin or mucous membranes.

5.4 While the above pests can pose significant health threats to humans, the FEHD's routine inspection programmes generally do not cover cockroaches, flies, stinging insects and ticks (see para. 3.22). These pests, as in the cases of many other nuisance pests, are mainly dealt with through the FEHD's handling of related complaints.

## *Changing pattern of vector-borne diseases*

5.5 In 2013-14, the FEHD's pest control services had an expenditure of $437 million, of which 53% was spent on mosquito control, 35% on rodent control, and 12% on the control of other nuisance pests (see Figure 1 in para. 1.8). However, this pattern of resource allocation may no longer be optimal having regard to the changing pattern of vector-borne diseases over the years. For example, many years ago, plague and malaria were the major vector-borne diseases that posed a threat to humans. Today, this is no longer the case. More recently, the risks of outbreak of dengue fever and JE have caused increasing public concerns.

5.6 As can be seen from Table 2 in paragraph 1.13, there had not been any plague cases in recent years. For malaria, they were all imported cases and the number had been decreasing in the past three years. On the other hand, reported cases of dengue fever, JE, scrub typhus and spotted fever had been increasing significantly. In view of the changing pattern of vector-borne diseases, there is a need for the FEHD to keep its strategy on pest control under constant review. In this regard, the FEHD needs to keep working in close liaison with the Department of Health to keep abreast of the latest trends of vector-borne diseases locally and in places outside Hong Kong (Note 38).

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**Note 38:** *Keeping a close watch of the development of vector-borne diseases in places outside Hong Kong is important. For example, according to information published by the Department of Health, dengue fever is an endemic disease in various popular tourist destinations for Hong Kong people, including the Philippines, Thailand, Indonesia, Malaysia and Singapore.*

### *Challenges facing the FEHD in the provision of pest control services*

5.7 Given the limited resources available for pest control work on the one hand, and the large geographical area that needs to be covered as well as the large variety of pests that require different types of surveillance and control work on the other, the FEHD is facing great challenges in its provision of pest control services. It is therefore most important for the FEHD to continue to enhance its pest control strategy which should comprise, among others, the following key elements:

(a) ***Pest surveillance programmes.*** Effective pest surveillance programmes should be in place covering, as far as possible, all areas over the territory. These programmes provide essential surveillance information for the FEHD to effectively plan and prioritise its limited resources for pest control work;

(b) ***Pest control operations.*** Pest control work should be conducted according to an effective programme that is regularly adjusted to address the risks of pest infestation identified through pest surveillance; and

(c) ***Promotion of pest control and environmental hygiene.*** Any pest control strategy will not be effective without community involvement. It is important to engage all stakeholders and the general public in pest control.

5.8 Audit considers that the FEHD needs to critically review its pest control strategy, taking into account the observations and recommendations in this Audit Report as well as the latest trends of vector-borne diseases locally and in places outside Hong Kong.

## Audit recommendations

5.9 **Audit has *recommended* that the Director of Food and Environmental Hygiene should:**

(a) **critically review the FEHD's pest control strategy, taking on board Audit's observations and recommendations in PARTs 2 to 4; and**

(b) **continue to work in close liaison with the Department of Health in keeping abreast of the latest trends of vector-borne diseases locally and in places outside Hong Kong.**

## Response from the Administration

5.10 The Director of Food and Environmental Hygiene generally agrees with the audit recommendations. She has said that:

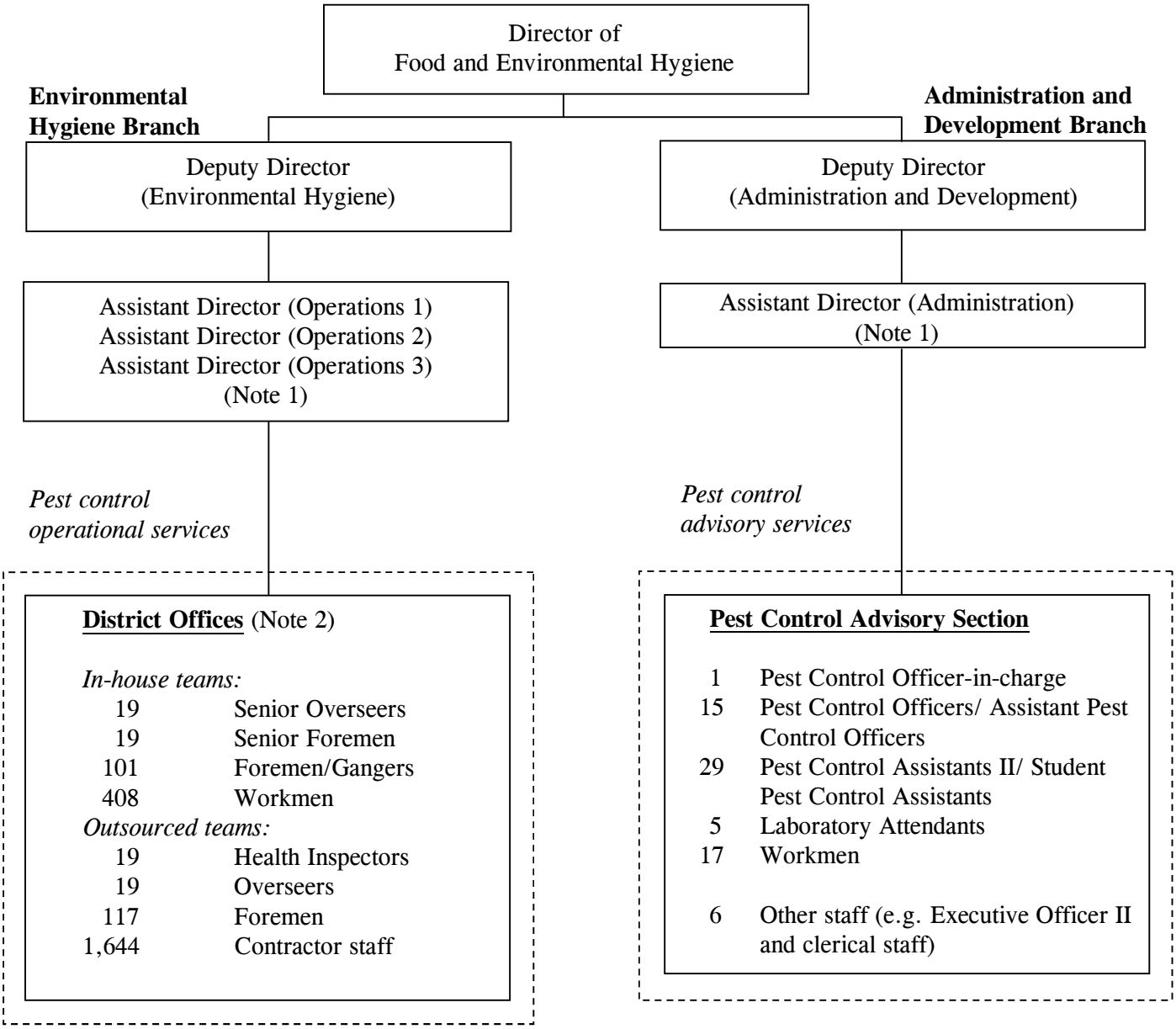
(a) the FEHD will continue to keep in view the pest control strategy, pest surveillance programmes, pest control operations and promotion of pest control and environmental hygiene, and to update them for the prevention of vector-borne diseases taking into consideration the advice given by the WHO and the Department of Health, results of surveillance, feedback from stakeholders as well as resource availability;

(b) the FEHD's first priority will continue to be placed on the prevention and control of vector-borne diseases such as plague, dengue fever and malaria listed by the WHO. Pests that pose public health threat, namely mosquitoes and rodents, would continue to be given a higher priority in allocation of resources in pest control and prevention; and

(c) the FEHD will continue to work closely with the Department of Health and other relevant departments on the prevention and control of vector-borne diseases. The advice given by the WHO would be taken into account.

**Appendix A**
(para. 1.7(b) refers)

# Pest control services of the Food and Environmental Hygiene Department
# Organisation chart
# (30 June 2014)




*Source: FEHD records*

*Note 1: The Assistant Directors also oversee other FEHD services besides pest control.*

*Note 2: Some non-directorate staff (e.g. Heads of District Offices) of the Environmental Hygiene Branch oversee various FEHD services including pest control. These staff are not shown in the organisation chart.*

**Appendix B**
(paras. 2.2 and 2.28 refer)

# Pest surveillance programmes of the Food and Environmental Hygiene Department (June 2014)

| Item | Programme (pest monitored) | Detail | Surveillance information generated |
|---|---|---|---|
| ***Rodent-related*** | | | |
| 1 | Rodent surveillance programme (rodents) | • The FEHD placed non-poisonous baits in selected areas in different districts.<br><br>• Around 55 baits were placed in each of the areas selected. | • Rodent infestation rates for different districts were compiled (i.e. the ratio of baits bitten at that district).<br><br>• The rodent infestation rate for a district generally reflects the situation of rodent infestation. |
| 2 | Rat-flea survey (rat fleas) | • The FEHD sampled live rats from different areas over the territory.<br><br>• Fleas were collected from the rats for analysis.<br><br>• The FEHD also dissected the rats to look for signs of plague infection. | • A key index was the rat-flea index, which was "number of rat fleas collected" divided by "number of rats examined".<br><br>• A rat-flea index of greater than 1 represents an increased potential plague risk for humans. |

**Appendix B**
(Cont'd)
(paras. 2.2 and 2.28 refer)

| Item | Programme (pest monitored) | Detail | Surveillance information generated |
|---|---|---|---|
| *Mosquito-related* | | | |
| 3 | Dengue vector surveillance programme (Aedine mosquitoes) | • The FEHD placed small plastic containers with dechlorinated water, known as ovitraps, at selected areas for detecting the larval breeding rate of Aedine mosquitoes.<br>• A number of ovitraps were placed in each area selected. | • Ovitrap indices were compiled (i.e. the percentage of ovitraps that were found to have positive larval breeding results).<br>• The ovitrap index for an area indicated the extensiveness of the distribution of Aedine mosquitoes in the area. |
| 4 | JE vector surveillance programme (Culex mosquitoes) | • The FEHD set mosquito trapping devices at selected areas to collect samples to detect the presence of Culex mosquitoes.<br>• The Culex mosquitoes found were tested for the presence of JE virus. | • The FEHD would announce the fact that JE virus was found in the mosquito samples. |
| 5 | Malaria vector surveillance programme (Anopheline mosquitoes) | • The FEHD conducted surveys of Anopheline mosquitoes and their larvae along streams over the territory.<br>• Mosquitoes were collected with trapping devices. Larvae were collected manually from the stream water. | • Malaria vectors had not been found since 2006.<br>• Such information was for internal reference. |

*Source: FEHD records*

**Appendix C**
(para. 2.5 refers)

# Rodent infestation rates (2013)

| District | | RIR |
|---|---|---|
| ***Hong Kong and Islands*** | | |
| 1 | Central/Western | 3.6% |
| 2 | Eastern | 5.9% |
| 3 | Southern | 1.1% |
| 4 | Wan Chai | 2.7% |
| 5 | Islands | 0.5% |
| ***Kowloon*** | | |
| 6 | Kowloon City | 4.2% |
| 7 | Kwun Tong | 2.0% |
| 8 | Mong Kok | 2.1% |
| 9 | Sham Shui Po | 6.6% |
| 10 | Wong Tai Sin | 5.8% |
| 11 | Yau Tsim | 0.9% |
| ***New Territories (East)*** | | |
| 12 | North | 1.6% |
| 13 | Sai Kung | 0.0% |
| 14 | Shatin | 1.3% |
| 15 | Tai Po | 2.7% |
| ***New Territories (West)*** | | |
| 16 | Tsuen Wan | 4.6% |
| 17 | Tuen Mun | 0.4% |
| 18 | Yuen Long | 8.3% |
| 19 | Kwai Tsing | 2.6% |
| | Overall | 3.1% |

*Source: FEHD records*

**Appendix D**
(paras. 2.6, 2.7 and 2.9 refer)

# Analysis of areas selected for rodent surveillance (June 2014)

| District | Type of area | | | Total no. of areas |
|---|---|---|---|---|
| | Residential area (No.) | Industrial area (No.) | Rear lane (No.) | |
| Central/Western | | | 3 | 3 |
| Eastern | 1 | 1 | 1 | 3 |
| Southern | 1 | 1 | | 2 |
| Wan Chai | | | 1 | 1 |
| Islands | 1 | | 1 | 2 |
| Kowloon City | | | 2 | 2 |
| Kwun Tong | | 1 | 1 | 2 |
| Mong Kok | | | 2 | 2 |
| Sham Shui Po | 1 | | 2 | 3 |
| Wong Tai Sin | 1 | | 1 | 2 |
| Yau Tsim | | | 2 | 2 |
| North | 1 | 1 | 1 | 3 |
| Sai Kung | 1 | | 1 | 2 |
| Shatin | 2 | | | 2 |
| Tai Po | 1 | | 1 | 2 |
| Tsuen Wan | | | 2 | 2 |
| Tuen Mun | 1 | 1 | | 2 |
| Yuen Long | 1 | | 1 | 2 |
| Kwai Tsing | 2 | | | 2 |
| Total | 14 | 5 | 22 | 41 |

*Source: FEHD records*

**Appendix E**
(paras. 2.28, 2.29
and 4.10 refer)

# Ovitrap indices
# (2013)

| Area | | Highest OI recorded (Note 1) | Month recorded |
|---|---|---|---|
| ***Hong Kong and Islands*** | | | |
| 1 | Chai Wan West | 10.7% | June |
| 2 | Shau Kei Wan and Sai Wan Ho | 25.4% | June |
| 3 | North Point | 22.2% | June |
| 4 | Wan Chai North | 14.0% | August |
| 5 | Happy Valley | 15.8% | June |
| 6 | Central, Sheung Wan and Sai Ying Pun | 16.4% | May and June |
| 7 | Sai Wan | 20.8% | June |
| 8 | Aberdeen and Ap Lei Chau | 18.2% | May |
| 9 | Pokfulam | 24.5% | June |
| 10 | Deep Water Bay and Repulse Bay | 21.8% | June |
| 11 | Cheung Chau | 5.7% | August |
| 12 | Tung Chung | 19.4% | May |
| ***Kowloon*** | | | |
| 13 | Tsim Sha Tsui | 14.0% | August |
| 14 | Mong Kok | 12.7% | August and October |
| 15 | Lai Chi Kok | 10.9% | June |
| 16 | Sham Shui Po East | 16.7% | May |
| 17 | Cheung Sha Wan | 16.7% | June |
| 18 | Kowloon City North | 16.4% | May |
| 19 | Hung Hom | 7.4% | September |
| 20 | Ho Man Tin | 18.9% | July |
| 21 | Wong Tai Sin Central | 17.7% | June |
| 22 | Diamond Hill | 9.1% | June |
| 23 | Kwun Tong Central | 28.6% | June |
| 24 | Lam Tin | 23.6% | May |
| ***New Territories (East)*** | | | |
| 25 | Tseung Kwan O | 36.2% | May |
| 26 | Sai Kung Town | 32.0% | May |
| 27 | Ma On Shan | 20.7% | June |
| 28 | Yuen Chau Kok | 14.3% | July |
| 29 | Tai Wai | 21.4% | June |
| 30 | Tai Po | 16.4% | September |
| 31 | Fanling | 19.6% | September |
| 32 | Sheung Shui | 12.7% | September |

**Appendix E**
(Cont'd)
(paras. 2.28, 2.29
and 4.10 refer)

| Area | | Highest OI recorded (Note 1) | Month recorded |
|---|---|---|---|
| ***New Territories (West)*** | | | |
| 33 | Tin Shui Wai | 16.4% | June |
| 34 | Yuen Kong | 21.7% | June |
| 35 | Yuen Long Town | 5.7% | June |
| 36 | Tuen Mun (South) | 15.1% | June |
| 37 | Tuen Mun (North) | 25.4% | May |
| 38 | So Kwun Wat | 23.6% | May |
| 39 | Tsuen Wan Town | 8.3% | June |
| 40 | Ma Wan | 4.0% | April, July and August |
| 41 | Sheung Kwai Chung | 20.4% | May |
| 42 | Kwai Chung | 18.9% | June |
| 43 | Lai King | 23.6% | June |
| 44 | Tsing Yi | 9.1% | September |
| ***Port areas*** | | | |
| 45 | Hong Kong International Airport (1 area) | 0.7% | June |
| 46 to 52 | Cross Boundary Check Points on Land (7 areas) | 11.8% | June |
| 53 to 56 | Private Cargoes Working Areas (4 areas) | 8.9% | June |
| 57 to 59 | Cross Boundary Ferry Piers (3 areas) | 15.8% | September |
| 60 to 68 | Container Terminals (9 areas) | 0.0% | (Note 2) |
| 69 to 74 | Public Cargoes Working Areas (6 areas) | 11.2% | June |

*Source: FEHD records*

*Note 1: All the 74 areas had a lowest recorded OI of 0% in 2013.*

*Note 2: A 0% OI was recorded throughout 2013.*

**Appendix F**
(paras. 2.39 and 2.41 refer)

# Case 1

## Handling of problematic ovitraps at the Tai Po surveyed area

1. On 16 May 2014, Audit conducted a site visit to observe how FEHD staff handle the ovitraps in the Tai Po surveyed area. There were 55 ovitraps placed in the area. Audit noted that 5 of the 55 ovitraps were problematic, as follows:

(a) 4 ovitraps had been relocated (see Photographs 8 and 9 for examples); and

(b) 1 ovitrap had lost its sealing sticker which had been peeled off.

2. The frontline staff collected all the 55 ovitraps and brought them back to office for examination of larval breeding results. The fact that the 5 ovitraps were problematic was not reported to the supervisor.

3. The 5 problematic ovitraps did not show any positive breeding results. For the other 50 ovitraps which were not problematic, positive breeding results were found in 2 ovitraps.

4. On 23 June 2014, the FEHD announced the OI for May 2014. The figure for Tai Po was stated at 3.6% (Note 1). The results of the 5 problematic ovitraps had not been excluded from the OI calculation.

***Audit comments***

5. The problematic ovitraps might not have functioned properly. They might also have been tampered with. It was unsatisfactory that these problematic ovitraps were not reported to the supervisor for further decision. Had the supervisor decided to exclude the 5 problematic ovitraps from the OI calculation, the OI for Tai Po would have read 4%, instead of 3.6% (Note 2).

*Source: Site visit on 16 May 2014*

*Note 1: 3.6% = (2 ovitraps with positive breeding results ÷ 55 ovitraps) × 100%*

*Note 2: 4% = (2 ovitraps with positive breeding results ÷ 50 ovitraps) × 100%*

**Appendix G**
(para. 2.64 refers)

## Actions to be taken on infestation of rodents and mosquitoes

| Indicator | Infestation | | Action |
|---|---|---|---|
| | **Level** | **Range of the indicator for a surveyed area** | |
| RIR | 1 | Below 10% | Routine rodent disinfestation programmes are conducted to prevent infestation from worsening. |
| | 2 | 10% to less than 20% | Block Control would be carried out (Note). |
| | 3 | 20% or above | A comprehensive rodent disinfestation operation would be launched in the surveyed area. To enhance the result of the operation, the cleansing service of the FEHD would complement the poison treatment by eliminating food sources and harbourages for rodents. A task force meeting would be convened to coordinate anti-rodent work among relevant government departments to strengthen rodent disinfestation, environmental improvement and cleansing services comprehensively, and to promote rodent control in the community. |
| OI | 1 | Below 5% | A one-off control operation to be mounted at areas within a 100-metre radius from the vector-positive ovitraps. |
| | 2 | 5% to less than 20% | Weekly inspection to be conducted around the vector-positive ovitraps to identify breeding/potential breeding places and eliminate such places as far as possible. |
| | 3 | 20% to less than 40% | Actions to be taken to initiate an inter-departmental task force and redeploy resources and mobilise staff of the district to eliminate the breeding/potential breeding places. |
| | 4 | 40% or above | In addition to the actions under level 3, adult mosquito control by fogging would be conducted in parallel with larval control whenever necessary. |

*Source: FEHD records*

*Note: Block Control involves treatment of a rodent population in its entirety according to the physical barrier for rodent activities in one operation.*

**Appendix H**

# Acronyms and abbreviations

| | |
|---|---|
| AFCD | Agriculture, Fisheries and Conservation Department |
| Audit | Audit Commission |
| District Office | District Environmental Hygiene Office |
| EDB | Education Bureau |
| FEHD | Food and Environmental Hygiene Department |
| JE | Japanese encephalitis |
| LCSD | Leisure and Cultural Services Department |
| LegCo | Legislative Council |
| OI | Ovitrap index |
| PCAS | Pest Control Advisory Section |
| RIR | Rodent infestation rate |
| WHO | World Health Organisation |