Key Area 1

Strengthen knowledge through surveillance and research

Objective 1

Enhance the existing antimicrobial resistance surveillance system under One Health for Hong Kong

Objective 2

Maintain laboratory capacity to support surveillance activities in both human and animal sectors

Objective 3

Monitor antimicrobial use in humans and animals

17. A comprehensive surveillance system is essential for assessing the size and nature of the AMR situation in Hong Kong and for monitoring the effectiveness of corresponding measures and interventions.

18. In 2015, WHO launched the **Global Antimicrobial Resistance and Use Surveillance System (GLASS)** which provides a standardised approach to the collection, analysis, interpretation and sharing of data by different countries[14]. The system adopts a "One Health" Approach which covers the surveillance of AMR in human, animal and food sectors.

19. A **Working Group on AMR One Health Surveillance** was established in October 2017 to steer and oversee the development of surveillance on AMR and antimicrobial use in Hong Kong in accordance with the GLASS standards. This effort resulted in the development and launch of the *One Health AMR Information System (AMRIS)* in March 2022. Its major capabilities include the ability to gather, analyse, share and link data from multiple existing and future surveillance and monitoring systems under DH, HA, AFCD, and FEHD, and to generate standardised surveillance report on both regular and ad hoc bases. The major AMR surveillance data collected by different contributing parties are summarized in the ensuing paragraphs.

Objective 1 - Enhance the existing antimicrobial resistance surveillance system under One Health for Hong Kong

20. Currently, the Centre for Health Protection (CHP) of DH collects AMR data from medical practitioners, laboratories, private hospitals and pharmaceutical trade through AMRIS and other means. The Public Health Laboratory Services Branch (PHLSB) of CHP supports public and private health service providers in bacterial isolation and antimicrobial susceptibility testing on bacterial isolates collected from public and private out-patient settings. Statistics on AMR control are promulgated and regularly updated (available online in CHP website[15]) and highlights are provided below.

21. The number of CA-MRSA cases notified to CHP remained at around 1,200 between 2016 and 2019, then experienced a drop to below 600 in 2021. The drop in number is possibly due to improved personal and environmental hygiene and social distancing measures adopted during the COVID-19 pandemic.

22. HA actively monitors selected MDROs through their routinely collected laboratory statistics from in-patient and out-patient microbiological investigations. While there was an absence of VRE resurgence, an increase of Acinetobacter species resistant or intermediate to carbapenems was observed and the percentages of MRSA, resistant *E. coli* and *Klebsiella* species remained high in recent years.

23. The Food Surveillance Programme by the Centre for Food Safety (CFS) is designed to control and prevent food hazards. It is a key component of the Centre's food safety assurance programme and is aimed to find out the safety of our food supply. Inspectors of the Centre take samples at import, wholesale and retail levels for microbiological testings, which covers both bacteria and viruses. The Centre has been promoting public awareness and also promulgate surveillance results for public information. The food surveillance programme will be strengthened by making it more risk-based and with a wider coverage. In particular, raw or undercooked foods and ready-to-eat foods are associated with the risk of AMR microorganisms. For details of food surveillance on AMR, please refer to **Objective 11**.

24. Since 2019, AFCD has initiated AMR surveillance on local food animals with samples routinely collected from local pig, chicken and fish farms. The small size of the Hong Kong pig and chicken production sectors means that the surveillance programme designed for Hong Kong differs from those in places with many farms. Samples for this programme were collected on farms rather than in the slaughterhouse or markets to reflect events that are occurring just prior to sale. Studies conducted previously by other groups have already highlighted the high levels of resistance in commensal organisms and have also identified the genetic basis of resistance for a number of organisms from farm animals reared in or imported to Hong Kong[16,17]. Similar findings have also been reported in the broader region[18].

25. While no obvious trend could be observed, the findings of the first years of the surveillance programme showed that the percentage of ESBL-E remained relatively stable and there was an absence of VRE in both chicken and pig farms. For Carbapenem-resistant *Enterobacteriaceae*, a small amount of samples tested positive. For fish farms, there were absence of ESBL-producing *Vibrio* spp. and Carbapenem-resistant *Vibrio* spp. in marine fish farms, similarly, absence of ESBL producing Aeromonas spp. and Carbapenem-resistant *Aeromonas* spp. in pond fish farms were observed. These results are in line with observations in other studies in the region, and provide a baseline on which changes over time in resistance patterns and genes associated with reduced susceptibility to antimicrobials can be assessed. The details of the AMR figures can be found on the AFCD website[19].

26. There is currently limited information available on ways to reduce ESBL-producing organisms in farms in Hong Kong. As such, in addition to routine AMR surveillance, AFCD will conduct research to determine the potential sources of ESBL-producing organisms in livestock farms, and subsequently determine and apply relevant interventions based on the evidence provided from the studies conducted. It should be noted that changes in resistance patterns are complex and a simple linear response between usage and resistance does not apply in all places/situation.

27. The existing AMR surveillance structure and system will be continued, with enhancements in response to the latest international and local trend and recommendations.

Strategic Interventions

1.1 Continue the current structure for One Health surveillance on AMR

- The Working Group on AMR One Health Surveillance will continue to deliberate on the collection and dissemination of AMR and antimicrobial use data, and provide recommendations to the EC for consideration

1.2 Continue to strengthen AMR surveillance in healthcare settings

- AMR surveillance based on WHO's GLASS reporting criteria will be continued, with updates of the surveillance activities in accordance to the latest development
- AMR surveillance at laboratory level for both in- and out-patient service providers will be continued. The WHONET software as promulgated by WHO for AMR surveillance in accordance with GLASS will be promoted for use by medical laboratories in Hong Kong

1.3 Continue AMR surveillance programme on animals

- To continue surveillance on AMR in food animal production farms
- To review AMR surveillance in local food animal production farms, with enhancement when appropriate
- To carry out supplementary studies, where necessary, related to AMR in local food animal production farms

1.4 Continue AMR surveillance programme on food

- To continue AMR surveillance in food

Objective 2 - Maintain laboratory capacity to support surveillance activities in both human and animal sectors

28. Laboratory support is essential to AMR surveillance. PHLSB under DH is currently the local reference laboratory to advise and support local medical laboratories in AMR surveillance. Both PHLSB and the HA Microbiology Laboratory Network has adopted standardised antibiotic sensitivity testing (AST) methods in accordance with the Clinical and Laboratory Standards Institute (CLSI) or the European Committee on Antimicrobial Susceptibility Testing (EUCAST). To allow uniformed comparison across different sectors, quality assurance and adoption of standardised AST method will also be required in other medical laboratories.

Strategic Interventions

2.1 Maintain laboratory support in AMR surveillance

- PHLSB under DH will continue to serve as the local reference laboratory to advise and support local medical laboratories in AMR surveillance

2.2 Standardise laboratory antimicrobial susceptibility testing method for AMR surveillance

- Both DH and HA will continue to adopt the latest international standards of AST, such as CLSI or EUCAST
- HHB will explore the registration of medical laboratories in Hong Kong to enhance quality assurance of laboratory performance, including those on antimicrobial susceptibility

2.3 Continue quality assurance programme and promote introduction in medical laboratories

- PHLSB, as the local reference laboratory, will continue its coordination with medical laboratories in Hong Kong in conducting quality assessment programme for continuous improvement of standards

Objective 3 - Monitor antimicrobial use in humans and animals

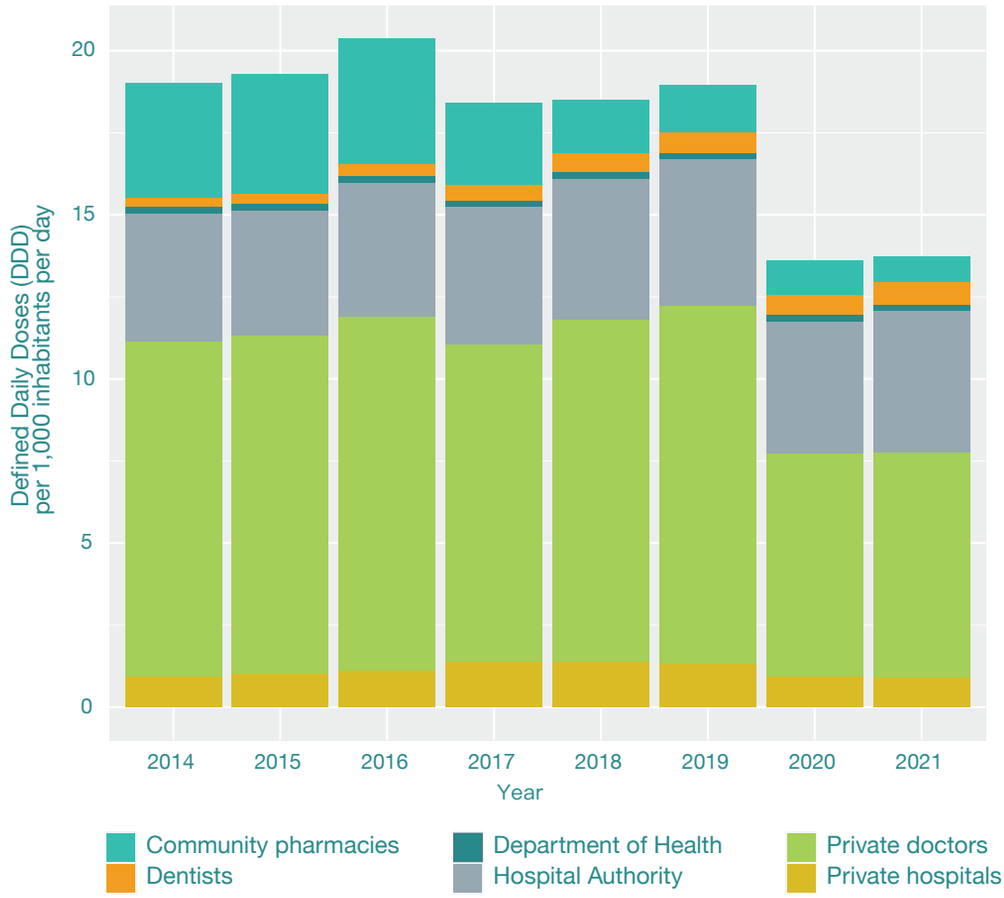
29. Currently, antimicrobial use (AMU) data in human and animal sector is collected, analysed and disseminated via the CHP website[20]. Surveillance and monitoring systems are in place to assess and control the trends in AMU. The unit of the presented data of AMU below is in terms of defined daily doses (DDD) per 1,000 inhabitants per day or per 1,000 patient-days", which provide a proxy for antimicrobial consumption in community setting and hospital setting respectively[21].

30. On the human side, under the Pharmacy and Poisons Ordinance (Cap. 138) and the Antibiotics Ordinance (Cap. 137), suppliers of pharmaceutical products and antibiotics are statutorily required to keep transaction records with supporting documents. Although the wholesale supply data is not equivalent to the actual consumption data of antimicrobials in Hong Kong, they can serve as a surrogate to reflect their usage. DH has been collecting the supply data for the analysis of all antibacterials for systemic use under WHO Anatomical Therapeutic Chemical (ATC) code J01 to various sectors, including HA, DH, private hospitals, private practitioners, pharmacies, dentists and veterinarians. In Hong Kong, 49.4% of antimicrobials supplied in Hong Kong went to private doctors, followed by HA (29.0%) and community pharmacies (7.5%) in 2021. There is significant drop of antimicrobial use, in particular among private doctors and community pharmacies in 2020 and 2021 when COVID-19 pandemic occurred. The reduction might be due to decrease in respiratory infections including influenza and drop in health seeking behavior by the general public[9,22].

31. Data on antimicrobial use in the healthcare facilities under HA is available through its electronic dispensing system. Despite the initiative on AMR control in Hong Kong, there has not been any noticeable reduction of AMU in HA in the past few years. Currently, prescription and dispensing data on antimicrobials from the private human sector lacking (to be discussed in detail under **Objective 4**).

32. Regarding AMU in the community, data on antimicrobial supply are collected from licensed wholesale traders to monitor the trend of antimicrobial utilisation. There has been a drastic decrease in the wholesale supply during COVID-19 pandemic (2020 and 2021) when compared with that of 2019 (**Figure 3**), and a continuous drop in the supply of antimicrobials to community pharmacies, from 18.5% in 2016 to 5.6% in 2021.

Figure 3: Total wholesale supply of antimicrobials



33. WHO has set a country-level target of “at least 60% of total antibiotic consumption being Access group antibiotics” under its Access, Watch, Reserve (AWaRe) Classification of antibiotics. Access group antibiotics refer to those antibiotics which are deemed less likely to induce AMR, for example, amoxicillin, cefazolin, cloxacillin, doxycycline, and metronidazole. In 2020 and 2021, the proportion of the antimicrobials under the “Access" classification reached 61.4% and 64.3% of the total antimicrobial supply in Hong Kong respectively, which were higher than WHO’s target (**Figure 4**).

34. On the animal side, the system adopted for local pig and chicken farms is based on monthly reports submitted voluntarily by farmers to AFCD, backed by audit testing. The surveillance programme officially commenced in 2019. Data collected at farm level can provide a relatively granular and accurate picture of AMU. Collection and testing of audit samples such as animal feed and faecal wastes on pig and chicken farms to help detect unreported or inadvertent AMU have also been implemented. It was noted from the first years of surveillance that there were limited usage of antimicrobials in chicken and fish production with a decrease in their total usage, while

Figure 4: Proportions of antimicrobials under the AWaRe classification

there was no representable increase observed in total usage in pig production (**Table 1**). These data on AMU can be used as a baseline for measuring changes in practices over time given action to reduce AMU on farms is relatively recent. Generally speaking, chicken producers use less antimicrobials than pig producers due, in part, to the shorter life span of chicken than pigs and the manner in which they are reared. Fish farms are not significant users of antimicrobials and there appears to be little scope to reduce levels used in this sector.

35. Overall, AMU in the food animal sectors in Hong Kong is higher than places with longstanding surveillance programmes (such as United Kingdom, Netherlands, Denmark), but is likely to be below those in some major pig producing European nations (such as Spain, Italy) (ESVAC 2019 and 2020 report). Note that results from different countries are not directly comparable given different systems for data recording and for animal production.

Table 1: AMU surveillance in chicken, pig and fish farms (2019-2020)

		2019	2020
Chicken farms	Calculated total quantity of AMU in kg	143.57	43.4
	AMU in mg/kg (Target animal biomass)	20.62	5.83
Pig farms	Calculated total quantity of AMU in kg	1753.49	1933.04
	AMU in mg/kg (Target animal biomass)	111.18	123.72
Fish Farms	Calculated total quantity of AMU in kg	15.73	0.37
	AMU in mg/kg (Target animal biomass)	4.97	0.12

Strategic Interventions

3.1 Continue antimicrobial use surveillance

- The CHP website will continue to serve as the centralised platform dissemination of antimicrobial use data from different sectors
- The use of standardised reporting formats and units, such as DDD in human use and mg/kg of meat produced in food animals, will be continued to facilitated comparison and trend monitoring

3.2 Monitor antimicrobial use in humans

- Collection of antibiotic dispensing data from HA and monitoring of antibiotic use in public hospitals and clinics will be continued through the AMRIS
- Please refer to **Strategic Intervention 4.4** for the details of "collection of prescription and dispensing data on antimicrobials from the private human sector"

3.3 Monitor antimicrobial use in animals

- To continue monitoring antimicrobial use in local food animal production farms
- To review monitoring on antimicrobial use in local food animal production farms, with enhancement when appropriate
- To carry out supplementary studies, where necessary, related to antimicrobial use in local food animal production farms