Antimicrobial resistance is becoming a major concern for public health worldwide. Resistant strains of common human pathogens are emerging and spreading more rapidly than ever before. The reasons for this are complex and are associated with the overuse and misuse of antimicrobials in humans and animals. The growth of resistance threatens to undermine the successes of communicable disease control programmes and individual patient care.

Effective containment of antimicrobial resistance requires an intersectoral approach at national, regional and global levels. In 1998, the World Health Assembly adopted resolution WHA51.17, which urged Member States to take urgent action to contain antimicrobial resistance. In 2001 WHO published a global strategy for containment of antimicrobial resistance. The strategy is intended to provide a strategic framework that Member States can use to develop national containment programmes.

This report is presented for the information of the Regional Committee and for discussion at its fifty-third session.
1. CURRENT SITUATION

The current situation with regard to antimicrobial resistance in the Region is described in the chapters devoted to malaria (pp. 19-26), tuberculosis (pp. 37-46), sexually transmitted infections, including HIV/AIDS (pp. 51-60) and essential drugs (pp. 149-157) in The Work of WHO in the Western Pacific Region: 1 July 2001–30 June 2002. The subject was also covered in some detail in the previous year's report: The Work of WHO in the Western Pacific Region: 1 July 2000–30 June 2001 (pp. 66-71).

Resistance to antimicrobial agents is a natural biological phenomenon. All antimicrobial agents have the potential to select drug-resistant subpopulations of micro-organisms. With the widespread use of antimicrobials, the prevalence of resistance to each drug will eventually increase. It is possible that resistant micro-organisms can be replaced by susceptible micro-organisms if selection pressure is removed. However, reversing resistance is generally slow, or impossible in some cases. Early interventions are therefore crucial for effective containment.

The emergence of antimicrobial resistance is a complex problem driven by numerous interconnected factors related to the overuse and misuse of antimicrobials. These include the over-the-counter availability of antimicrobials without prescription; insufficient or ineffective regulations governing licensing, distribution and use of antimicrobials; irrational use of antimicrobials (e.g. premature cessation of treatment or overlong treatment); the wide availability of counterfeit and substandard antimicrobials; and patients' false perceptions about antimicrobials. It is believed that overuse of antimicrobials in food-producing animals is associated with the emergence of resistance in human pathogens.

Resistance rates for many micro-organisms are increasing in both developing and developed countries of the Region, although rates and patterns of resistance vary significantly from country to country and within countries. In many countries, common micro-organisms are often resistant to all cheap and widely available first-line drugs. For example, 20%–50% of Streptococcus pneumoniae are resistance to widely available antibiotics such as penicillin, erythromycin and sulfamethoxazole/trimethoprim. In Viet Nam, the majority of Salmonella Typhi, a causative agent for typhoid fever, are resistant to all first-line antibiotics (i.e. ampicillin, chloramphenicol, and sulfamethoxazole/trimethoprim). For some micro-organisms, resistance to second- and third-line drugs has already emerged, seriously compromising treatment outcomes. Prevalence of resistant strains to newly developed fluoroquinolones has already been increasing in many countries in the Region. Incidence
of hospital-acquired infections with resistant agents is also increasing. In some countries up to 80% of hospital-acquired *Staphylococcus aureus* infections are methicillin-resistant (MRSA).

Drug resistance surveillance in several countries and areas has demonstrated prevalence of multidrug-resistant tuberculosis among new cases ranging from 0% to 10.8%. In China, serious levels of multidrug resistance have been found in two of the five provinces that have completed drug-resistance surveillance studies.

The WHO Western Pacific Region Gonococcal Antimicrobial Surveillance Programme (GASP) monitors drug resistance susceptibility in the Region and has published surveillance data annually since 1992. The Region has an unfortunate history of antimicrobial resistance in gonococci. *Neisseria gonorrhoeae* resistant to penicillin, spectinomycin and quinolone have all appeared in and spread beyond the Western Pacific Region. Very high percentages of resistance to combined forms of penicillin have been recorded in Brunei Darussalam (63%), China (80%), Hong Kong (China) (54%), the Republic of Korea (91%), Papua New Guinea (36.5%), the Philippines (89%), Singapore (58%), and Viet Nam (48%).

Average figures from surveys conducted between 1996 and 2001 reveal high prevalence of *Plasmodium falciparum* resistant to chloroquine in Cambodia (31%), the Lao People's Democratic Republic (17%), Malaysia (54%), Papua New Guinea (73%), the Philippines (51%), Solomon Islands (34%), and Viet Nam (11%). High prevalence of resistance to sulfadoxine-pyrimethamine was found in the Lao People's Democratic Republic (25%), Malaysia (37%), the Philippines (57%) and Viet Nam (24%).

Resistance significantly increases health care costs as second- and third-line drugs are usually much more expensive than first-line drugs. Patients with resistant strains may also require prolonged treatment or hospitalization, leading to further costs.

In 2001, WHO published a global strategy for containment of antimicrobial resistance. The strategy provides a framework for interventions to slow the emergence and reduce the spread of antimicrobial resistance.1

Communicable diseases continue to be major causes of morbidity and mortality in the Western Pacific Region and antimicrobial treatment at all levels of health care has made a very significant

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contribution to reducing their negative impact. However, these gains are now threatened by increases in antimicrobial resistance.

2. ISSUES

1. The emergence and the spread of antimicrobial resistance are driven by numerous interrelated factors. Effective containment therefore depends on coordinated interventions by different sectors.

2. Massive increases in trade and travel have facilitated the rapid spread of infectious agents, including those resistant to antimicrobials. No single country can protect itself from the importation of resistant pathogens.

3. In many countries, the prevalence of resistance to readily available cheap antimicrobials among common pathogens is so high that these antimicrobials are now of limited clinical effectiveness. Antimicrobial resistance therefore threatens to undermine health care programmes.

4. In many countries, there is a lack of understanding among both health professionals and the general public of the causes and effects of drug resistance.

5. In many countries, weak legislation and regulations and ineffective enforcement mean that there is very little control over public access to antimicrobials.

6. In some countries, health staff profit by prescribing and dispensing antimicrobials, which leads them to prescribe unnecessary or new and more expensive antimicrobials.

7. Antimicrobials are extensively used in food-producing animals as regular supplements for prophylaxis and as growth promoters. There is growing evidence that there is a link between the use of antimicrobials in food-producing animals and the emergence of resistance in human pathogens.

8. The number of new antimicrobials being developed is declining. There are a number of reasons for this, including the fact that there are now many antimicrobials and the market share of each is getting smaller; it is becoming more difficult to develop new antimicrobials; the cost of developing new antimicrobials is increasing; and the market life of an
antimicrobial is getting shorter. The fact that fewer new antimicrobials are being developed means that there may be a shortage of effective agents to combat some pathogens in future.

9. Second-line drugs used for multidrug-resistant tuberculosis are still about 50 times more expensive than first-line drugs used in DOTS programmes to treat non-drug-resistant tuberculosis.

3. ACTIONS PROPOSED

The following actions by Member States are proposed for consideration by the Regional Committee.

1. Create a national intersectoral task force to develop and implement a national plan to promote interventions to contain resistance. Such a task force should include representatives of health care professionals, veterinarians, the agricultural sector, pharmaceutical manufacturers, government, media, consumers and other interested parties.

2. In order to promote rational use of antimicrobials, establish and maintain national standard treatment guidelines and an essential drug list consistent with these guidelines.

3. Promote education and awareness in patients, the general community, policy-makers, prescribers and health care professionals in order to reduce overuse and misuse of antimicrobials.

4. Enforce regulations and legislation controlling drug supply, distribution, dispensing and sales. Ensure that antimicrobials are available only on prescription, except in special circumstances.

5. Strengthen surveillance systems for antimicrobial resistance and ensure timely dissemination of data to the national intersectoral task force, authorities responsible for standard treatment guidelines, and drug policy-makers and prescribers.

6. Establish a mechanism that provides economic incentives for the appropriate use of antimicrobials.

7. Establish infection control programmes in hospitals, based on current best practice.