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REPORT OF THE INFORMAL CONSULTATION ON AIRCRAFT DISINSECTION

WHO/HQ, GENEVA, 6-10 NOVEMBER 1995

UNEP

United Nations Environment Programme
Programme des Nations Unies pour l'Environment

International Labour Office
Bureau International du Travail

World Health Organization
Organisation mondiale de la Santé

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ACRONYMS

AIHA:	American Industrial Hygienist Association
CFC:	chlorofluorocarbon
DHI:	dengue haemorrhagic fever
DME:	dimethylether
ECETOC:	European Centre for Ecotoxicology and Toxicology of Chemicals
FAO:	Food and Agriculture Organization of the United Nations
FEV_1:	forced expiratory velocity
GWP:	global warming potential
HC:	hydrocarbon
HCFC:	hydrochlorofluorocarbon
HFC:	hydrofluorocarbon
IARC:	International Agency for Research on Cancer
ICAO:	International Civil Aviation Organization
IGR:	insect growth regulator
IPACT:	International Pharmaceutical Consortium for Toxicity Testing
IPCS:	International Programme on Chemical Safety
IPPC:	International Plant Protection Convention
JE:	Japanese encephalitis
LC_{50}:	lethal concentration for 50% of experimental animals
LD_{50}:	lethal dose for 50% of experimental animals
MCS:	multiple chemical sensitivity
MDI:	metered dose inhalers
NOEL:	No-observed-effect level
ODP:	ozone-depleting potential
OIE:	Office Internationale des Epizooties
OP:	organophosphates
PAFT:	Programme for Alternative Fluorocarbon Toxicity Testing
ppm:	part per million
TWA:	time-weighted average
ULV:	ultra-low volume
WHO:	World Health Organization

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1. INTRODUCTION

An informal consultation was convened at WHO Headquarters from 6-10 November 1995 to address contemporary issues relating to the disinsection of aircraft, and was generously supported by the US Department of Transportation.

The Consultation was opened by Dr W. Kreisel, Executive Director, on behalf of the Director-General. In his opening remarks, Dr Kreisel observed that international air traffic has increased to such an extent that its possible role in the spread of human, veterinary and plant diseases required careful examination. Not only may insect vectors transmit diseases to people in flight but also to people in places served by aircraft. In addition, aircraft may introduce insect vectors to places where they were not previously present.

WHO Expert Committees have had a long interest in the potential transport of disease vectors by aircraft. Their conclusions and recommendations have been published as WHO recommendations to Member States, most recently in 1985. Since then, concern over the chlorofluorocarbon propellants recommended for aerosols to be used for disinsection of aircraft has led to a reconsideration of their use.

A number of countries require disinsection of aircraft prior to landing. Others do not accept this practice, particularly if it is carried out when passengers are on board. Increasingly, the advice of WHO is being sought concerning the risk to human health, both if aircraft are sprayed or are not sprayed. There is also growing concern, over practice of aircraft disinsection, amongst international organizations concerned with air transport and the public.

The Consultation was therefore specifically needed to evaluate the available scientific data and experts were requested to make recommendations to WHO as to:

1) whether disinsection of aircraft is needed;

2) if needed, how should it be implemented;

3) which chemicals (pesticides, solvents and propellants) and which methods can be recommended.

The Consultation would be expected to devote itself to evaluating the needs for aircraft disinsection and assessing the risks to passengers and crew arising from its use. Only valid scientific information would be considered so that the conclusions and recommendations of the consultations would be scientifically justifiable and realistic.

Professor M. Lotti, Padua, Italy, was appointed as Chairman, and Dr A.L. Black, Canberra, Australia Rapporteur. The agenda of the meeting and a list of participants are attached as Annexes 1 and 2.

The Consultation convened in plenary session for comprehensive discussion of aspects relating to aircraft disinsection and divided into three working groups to consider the different aspects in detail.

2. GLOBAL PERSPECTIVE

2.1 Nature and extent of the problem

More than half of the world's population is at risk of infection by vector-borne disease. For any given vector-borne disease, there are countries or regions that are currently endemic for that disease. There are also areas where these diseases do not currently occur, but which are susceptible to introduction or re-introduction of vectors and pathogens. The magnitude of the health problem caused by five major vector-borne diseases is shown in Table 1.

Table 1: Tropical vector-borne diseases of importance in international air travel

DISEASE	NUMBER OF AFFECTED COUNTRIES	POPULATION AT RISK	MORTALITY	MORBIDITY
Malaria	90	2,300 million	1.5 - 2.7 million	300-500 million cases/year
Dengue/DHF	100	2,500 million	25,000	10-25 million/year
Lymphatic filariasis	76	1,100 million	--	100 million infected*
Leishmaniasis	88	350 million	--	12 million/year
Chagas disease	21	100 million	45,000	3 million/year

* 43 million disabled

2.2 International movement of vector-borne diseases

Vectors and pathogens can be transported between nations by air, sea, or land. Pathogens can be transported either in infected humans or in infected vectors. There is abundant evidence that vectors and vector-borne disease agents are transported internationally. Transport is achieved both in cargo and in passenger-carrying craft.

Surveillance programmes at airports and seaports have documented the importation of known or potential mosquito vector species, among them, *Aedes aegypti*, *Aedes albopictus*, *Aedes polynesiensis*, *Aedes scapularis*, *Aedes togoi*, *Anopheles gambiae*, *Anopheles albimanus*, *Anopheles barbirostris*, *Anopheles subpictus*, *Culex pipiens*, *Culex quinquefasciatus*, *Culex annulirostris*, *Culex sitiens*, *Culex tritaeniorhynchus*, *Mansonia uniformis*. Other possible insect vectors belonging to the families *Muscidae* and *Reduviidae* have also been intercepted (Craven et al., 1988; Evans et al., 1963; Hughes, 1961; Le Maitre & Chadee, 1983).

Each year cases of vector-borne disease are documented in countries outside the known distribution of the disease. In the USA, for example, about 130 cases of dengue were reported each year between 1986 and 1992 (Rigau-Perez et al., 1994). Similarly, during the 27 years from 1966 to 1992, an average of 1324 cases per year of malaria was reported for that country (Zucker et al., 1995).

In the great majority of instances, these infections were acquired by people while travelling in known endemic regions of the world. In other instances, however, infections are seen in persons with no travel history. In the case of malaria, some of these latter infections may be due to infection through blood transfusion or by needle sharing among intravenous drug users. Still other cases are due to transmission by local vectors (Maldonado et al., 1990, Layton et al., 1995) that have bitten infected travellers or other infected people (such as migrant workers or illegal immigrants). Finally there is some evidence that, at least in the case of malaria, infected vectors may actually be transported by means of aircraft or ships.

3. HUMAN DISEASES AND THEIR VECTORS

3.1 Malaria

Malaria is transmitted by *Anopheles* mosquitoes in some 90 countries, mainly in tropical areas. Millions of deaths from malaria still occur annually, mostly in Africa (WHO, 1994c). Among the four species of human malaria parasites, *Plasmodium falciparum* is the most pathogenic while *Plasmodium vivax* is the most widespread and likely to cause clinical relapses.

Among the countries currently free of endogenous malaria, many remain vulnerable and receptive. Vulnerability is related to the actual number of imported cases. Receptivity refers to the number of new cases of malaria that might originate from a single imported case, considering the vectorial capacity of local anopheline species of malaria vectors (Gilles and Warrell, 1993).

In considering the risks of aircraft carrying infected malaria vectors or human malaria cases to new areas it is convenient to define some of the origins of malaria cases as follows (WHO, 1963):

imported malaria: cases of human infection acquired when the person visited another country;

introduced malaria: cases due to local transmission from an imported case;

airport malaria cases involve passengers on aircraft or people in countries where malaria is not endemic, due to transmission of malaria by infective *Anopheles* mosquitoes brought on aircraft from a malarious area (Isaacson, 1989);

runway malaria cases are those contracted by people who acquire the infection from infective *Anopheles* mosquitoes which bite them at an airport during a stopover in a