**How does DDT used for malaria vector control affect human health?**

**What kind of human diseases can occur by DDT exposure?**

**What is needed to clearly detect the health risks related to the use of DDT?**

There is an on-going debate about the elimination of DDT used against malaria due to its negative impact on the human and environmental health. This factsheet provides answers to frequently asked questions about human health concerns related to the use of DDT for malaria vector control.

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**Background**

Malaria is one of the major global health problems and has a devastating impact on many populations, particularly in Africa. Each year, malaria causes several hundred million episodes of illness and approximately one million deaths (UN Millennium Project 2005).

DDT is an insecticide that was used worldwide until the 1970s, when concerns about its toxic effects, its environmental persistence, and its concentration in the food supply led to restrictions and prohibitions. In addition, unsuccessful interventions with DDT due to resistance developed by insects contributed to its phase out in agriculture (Eskenazi et al. 2009).

Amongst other chemicals, DDT continues to be used for malaria control by Indoor Residual Spraying (IRS) in several African and Asian countries (UNEP 2002).

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**EXPOSURE**

In regions where DDT is still used for IRS, local residents can be exposed to residues of DDT through various pathways including indoor air, dust, soil, food and water. The results of the various studies raise concern regarding the potential health effects in residents living in an environment shown to be polluted with DDT.

High levels of human exposure to DDT among those living in sprayed houses have been found in recent studies in South Africa and Mexico (Aneck-Hahn et al. 2007; Bouwman et al. 1991; De Jager et al. 2006; Van Dyk et al. 2010 and Yanez et al. 2002).

The results also confirm that harmful levels of DDT are still present in the indoor air approximately 3 months after the DDT has been sprayed (Van Dyk et al. 2010).

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**IMPACTS**

Exposure of DDT has been associated with the following negative health effects:

- **Cancer**
  
The result of a study conducted in 2006 shows a strong relationship between DDT exposure and liver cancer incidence. Cancer incidence increased by 77% in populations with high exposure. (McGlynn et al. 2006).
  
  Breast cancer has been most rigorously studied even though the majority of results showed no causative association with DDT exposure (Brody et al. 2007). However some evidence indicates an increased risk in women who were exposed at a young age (Cohn et al. 2007).

- **Diabetes**
  
  A study conducted in 2007 and 2009 showed that women exposed to high levels of persistent organic pollutants such as DDT had a significantly increased risk of having diabetes (Rignell-Hydbom et al. 2009).

- **Pregnancy and Infants**
  
  Different studies indicated and proved the association between high DDT exposure and higher risk for foetal loss. One study showed that the risk was increased in the group with the highest amount of total DDT serum concentration...
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(Venners et al 2005).

A study published in 2001 showed that serum concentration of DDE (metabolite of DDT) is associated with increased premature birth which can lead to higher infant mortality. There exist proved evidences that DDE reduces lactation and therefore has serious impact on infant mortality (Gladen and Rogan 1995).

Acknowledging that prenatal exposure also has serious implications, it is during the breast-feeding period that the infant probably gets exposed to the highest lifetime concentration of insecticides such as via a variety of routes (Bouwman and Kylin 2009).

A study in 2009 proved that newborn boys of mothers living in a village that was sprayed with DDT had a significantly higher risk (33%) to develop an urogenital birth defect (Bornman et al. 2009).

- **Reproductive Impacts**

Both DDT and DDE concentration were associated in a study with negative impacts on the menstruation process (Ouyang et al. 2005).

A study showed evidence that exposure to persistent organic pollutants is associated with slightly higher proportion of Y-chromosome bearing sperms (Tiido et al. 2005). Different studies expressed the concern that chronic DDT exposure has a negative impact on male reproductive health and fertility potential (Messaros et al. 2009; Jager et al. 2006, Aneck-Hahn et al. 2007).

- **Neurodevelopment**

Ribas-Fitos (2006) indicated that even low doses of DDT were associated with a decrease in cognitive skills among preschoolers in Spain. Another study found evidence that occupational exposure to DDT is associated with a permanent decline in neurobehavioral functioning and an increase of neuropsychological and psychiatric symptoms (Van Wendel et al. 2001).

### Conclusion

1. Studies on long-term health effects of DDT have focused mostly on subjects in North America and Europe, who have generally been exposed to levels lower than those reported from areas with IRS.

2. So far, assessments of health risks related to DDT IRS indicate that indoor residual spraying can result in substantial exposure, and that DDT therefore may pose a risk to exposed human populations.

3. Even though existing studies bear much concern particularly in relation to chronic effects, results must be interpreted with caution. It is alleged that results have not been consistent between studies, and the association between various organochlorines is not well specified (Cox 2007).

4. In view of recent publications showing negative human health impacts of people exposed to DDT through IRS, DDT can no longer be recommended for safe and effective malaria control in particular with the availability of equally effective but safe alternatives.

### Recommendation

In view of increasing global concern about the effects of chemicals on human health including the concern over the spreading of DDT IRS, it is recommended, to:

1. eliminate DDT for disease vector control,

2. carefully monitor and assess the consequences of DDT exposure to human health (and the environment),

3. rapidly expand the utilization of sustainable and effective alternatives to DDT (and other toxic chemicals) in integrated vector control management (e.g. through supporting the Global Alliance of the Stockholm Convention and its cooperative actions).
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References


Bouwman, H, Kylin, H. (2009): Malaria Control Insecticide Residues in Breastmilk: The Need to consider Infant Health Risks; Environmental Health Perspectives. (online: http://dx.doi.org; accessed October 20, 2010).


Messaros, B. et al. (2009): Negative effects of serum p,p0-DDE on sperm


Further Reading


In this paper a review on 494 studies was conducted on adverse health effects of DDT published between 2003 and 2008. It was concluded that "there is a growing body of evidence that exposure to DDT and DDE may be associated with breast cancer, diabetes, decreased semen quality, spontaneous abortion, and impaired neurodevelopment in children."