香港第二次總膳食研究：亞硫酸鹽

The Second Hong Kong Total Diet Study: Sulphites

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食物環境衞生署
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總膳食研究背景
BACKGROUND OF TDS

國際公認的方法

- 以評估市民從整體膳食攝入一系列化學物的分量
- 為食物安全風險評估和食物供應規管提供科學基礎

Internationally recognised approach

- to estimate population dietary exposure to a wide range of chemical substances across the whole diet
- to provide scientific basis for assessing food safety risks and regulating food supply

總膳食研究背景(二)
BACKGROUND OF TDS (2)

總膳食研究有別於傳統食物監測計劃

- 側重於整體膳食而非個別食品
- 處理食物至可食用狀態，考慮到處理過程對化學物的影響
- 評估市民實際從膳食攝入化學物的分量

TDS differs from traditional food surveillance programme

- focus on the whole diet, not individual food
- prepare food samples to "as consumed" form, taking into account the impact of food preparation
- assess dietary exposure to chemical substances actually ingested by the population

總膳食研究背景(三)
BACKGROUND OF TDS (3)

聯合國糧食及農業組織和世界衛生組織

- 鼓勵所有國家以公共衛生為大前提，進行總膳食研究

全球許多國家已進行總膳食研究

The Food and Agriculture Organization of the United Nations (FAO) and World Health Organization (WHO)

- encourage all countries to undertake TDS as a matter of public health significance

Many countries/regions worldwide have conducted their own TDS

總膳食研究背景(四)
BACKGROUND OF TDS (4)

香港首個總膳食研究在2010-14年間進行

- 研究結果為食物安全風險評估和食物供應規管提供科學基礎

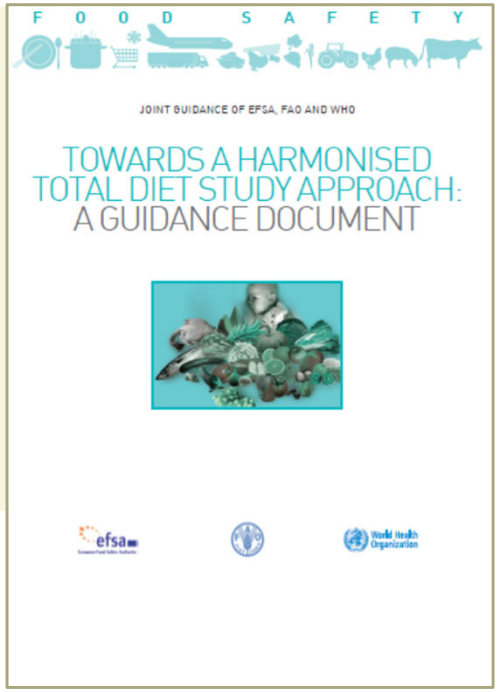
The first TDS was conducted in Hong Kong in 2010-14

- study results provided scientific basis for assessing food safety risks and regulating food supply in Hong Kong

香港第二次總膳食研究
THE SECOND HONG KONG TOTAL DIET STUDY (2nd HKTDS)

研究策劃時已考慮

- 香港首個總膳食研究所得的經驗
- 國際間在總膳食研究方法的最新發展
- 已取得的本地市民最新的食物消費量數據



2018-2020

Project planning has taken into consideration

- experience gained in the 1st HKTDS
- latest international development on TDS methodology
- updated food consumption data available for the local population

香港第二次總膳食研究的目的
OBJECTIVE OF THE 2nd HKTDS

評估香港市民及不同年齡和性別人口組別，從膳食攝入的一些可能有潛在風險物質的分量，從而評估攝入這些物質對健康帶來的風險

To estimate the latest dietary exposure of the Hong Kong population and various age-gender subgroups to some chemical substances of potential food safety concern, and in turn to assess the associated health risks

香港第二次總膳食研究的方法 METHODOLOGY OF THE 2nd HKTDS

1. 選定檢測的物質
   Selection of chemical substances
   >130種物質，例如食物添加劑、除害劑殘餘
   >130 substances, e.g. food additives, pesticide residues
2. 制定總膳食研究食物名單
   Development of a TDS food list
   187種食物，在本地膳食中具代表性
   187 food items, representative of the local diet
3. 抽取食物樣本
   Food sampling
   由2023年2月至2024年1月，分兩次抽樣
   Conducted from Feb 2023-Jan 2024, in 2 sampling occasions
4. 處理食物樣本
   Sample preparation
   2,244個別食物樣本經處理後，合併成374個混合樣本
   2,244 individual samples prepared and combined into 374 composite samples
5. 化驗分析
   Laboratory analysis
   分階段進行分析
   Conduct in phases
6. 膳食攝入量評估
   Dietary exposure assessment
   結合化驗結果及食物消費量數據後，與健康參考值作比較
   Combine laboratory results and food consumption data, and compare against health-based guidance values
7. 公佈結果
   Publication of results
   分階段公佈
   Publish in phases

- 第二次全港性食物消費量調查 2018-2020
- 較年輕群組的食物消費量調查 2021-2022
- 2nd Population-based Food Consumption Survey (2018-2020)
- Food Consumption Survey in the Younger Population (2021-2022)

食物消費量調查
FOOD CONSUMPTION SURVEYS

食物消費量調查收集本港人口食物消費量的資料（包括進食食物的種類和分量等），這些數據支援中心日常的風險評估工作

- 第二次全港性食物消費量調查 2018-2020: 18歲或以上
- 較年輕群組的食物消費量調查 2021-2022: 6至17歲
  - 本總膳食研究首次運用本地6至17歲群組的食物消費量數據進行膳食攝入量評估

Food consumption surveys collect food consumption data of the local population (including the types and amounts of food consumed by individuals), which supports CFS's day-to-day risk assessment work

- The Second HK Population-based Food Consumption Survey 2018-2020: aged 18 & above
- Food Consumption Survey in the Younger Population 2021-2022: aged 6 -17
  - This TDS is the first study using local food consumption data of aged 6-17 population for dietary exposure assessment

香港第二次總膳食研究檢測的化學物質
SELECTED CHEMICAL SUBSTANCES UNDER THE 2ND HKTDS

檢測的化學物質包括食物添加劑、除害劑殘餘、霉菌毒素、金屬污染物、食物加工所產生的污染物、持久性有機污染物等

- 共約10個研究報告，由現在至2026年分階段發布

Selected chemical substances include food additives, pesticide residues, mycotoxins, metallic contaminants, process contaminant, persistent organic pollutants, etc.

- about 10 study reports in total, will be released in phases from now until 2026

香港第二次總膳食研究的方法:小結

METHODOLOGY OF THE 2nd HKTDS: SUMMARY

1. 集中分析一些可能有潛在風險的物質，並首次包括一些在本地受關注的食物添加劑
2. 更廣泛地涵蓋本地市民所進食的食物，提高後續膳食攝入量評估的準確性
3. 膳食攝入量評估不僅涵蓋成年人口，並首次涵蓋較年輕群組

1. Focuses on some chemical substances of potential food safety concern, and for the first time, some food additives of local concern
2. Covers a wider range of food items consumed by the local population, enhancing the accuracy of subsequent dietary exposure estimation
3. Covers dietary exposure estimation not only for the adult population, but also the younger population

亞硫酸鹽：
研究結果、建議

Sulphites:
Study results, recommendations

亞硫酸鹽
SULPHITES

中心的食物監測計劃已包括監察食物中的亞硫酸鹽

- 偶爾有不合格的結果

本港未有進行對亞硫酸鹽的整體膳食攝入量評估

Sulphites in foods have been monitored through CFS's Food Surveillance Programme

- Occasional unsatisfactory surveillance results were noted

Comprehensive dietary exposure assessment on sulphites has not been conducted in HK

亞硫酸鹽:特性
SULPHITES: NATURE

二氧化硫（SO_2）是一種無色氣體，有強烈刺激性氣味，溶於冷水

SO_2 也以鹽的形式使用，統稱為亞硫酸鹽

- 由亞硫酸/亞硫酸氫/焦亞硫酸與鈉/鉀/鈣結合成的鹽

Sulphur dioxide (SO_2) is a colourless gas with a strong pungent odour, and is soluble in cold water

SO_2 is also used in the form of salts, collectively referred to as sulphites

- consist of sodium/potassium/calcium and sulphite/bisulphite/metabisulphite

亞硫酸鹽:用作食物添加劑
SULPHITES: USES AS FOOD ADDITIVE

因其多功能特性，應用於食品生產中已有悠久歷史

- 例如用作防腐劑和抗氧化劑，以延長食物保質期，防止食物變成褐色

使用亞硫酸鹽作防腐劑及抗氧化劑受《食物內防腐劑規例》（第132BD章）所規管

- 規例訂明可用於指明食物中的指明分量

Long history of use in food production for their multifunctional properties

- e.g. as preservative and antioxidant, to prolong product shelf-life and prevent browning

The use of sulphites as preservative and antioxidant is regulated under the Preservatives in Food Regulation (Cap. 132BD)

- stipulates the use of sulphites in specified foods within specified levels

亞硫酸鹽:攝入途徑
SULPHITES: SOURCES OF EXPOSURE

對大多數人而言，食用使用了亞硫酸鹽作為食物添加劑的食品和飲料是攝入亞硫酸鹽的途徑

使用化妝品和藥物、空氣污染和某些工業活動也可能導致攝入亞硫酸鹽

For the majority of people, exposure to sulphites occurs as a result of consumption of foods and drinks to which sulphites have been used as food additives

Exposure to sulphites may also occur through the use of cosmetic products and drugs, polluted air and certain industrial activities

亞硫酸鹽:在食物中的變化
SULPHITES: FATE IN FOOD

亞硫酸鹽經儲存和加工後，在食物中的殘留量會降低

- 清洗和烹煮可除去食物中大部分亞硫酸鹽

最初用於處理食品的亞硫酸鹽分量，並不等同個人食用經亞硫酸鹽處理食品的最終攝入量

Residue levels of sulphites in food decrease after storage and processing

- most of the sulphites can be removed through washing and cooking

Amounts of sulphites initially used to treat foods are not equal to the final amounts of sulphite ingested by the individuals consuming the sulphites-treated foods

亞硫酸鹽:對健康的影響
SULPHITES: HEALTH EFFECTS

急性毒性低

在實驗動物中，長期過量攝入可引致胃部受刺激和影響中樞神經系統

對亞硫酸鹽有過敏反應的人士，攝入後可能會引起支氣管收縮和其他不良反應

Acute toxicity is low

Chronic excessive exposure was found to cause local irritation of the stomach and induce adverse effects on the central nervous system in experimental animals

Exposure to sulphites may lead to bronchoconstriction and other adverse reactions in susceptible individuals who are sensitive to sulphites

亞硫酸鹽: 健康參考值
SULPHITES: HEALTH-BASED GUIDANCE VALUE

每日可攝入量*：每公斤體重0-0.7毫克

(聯合國糧農組織 / 世衛食品添加劑聯合專家委員會)

* 每日可攝入量着眼於長期攝入的分量，只要攝入量並非長期超出該水平，偶爾高於每日可攝入量，不會造成慢性健康影響

Group Acceptable Daily Intake (ADI)*: 0-0.7 mg/kg body weight (bw)

(Joint FAO/WHO Expert Committee on Food Additives)

* Transient excursion above the ADI would have no chronic health consequences provided that the average intake over long-term is not exceeded as the emphasis of ADI is long-term exposure

亞硫酸鹽:化驗分析
SULPHITES: LABORATORY ANALYSIS

分析185種食物
（370個混合樣本）
的亞硫酸鹽含量

185 TDS food items
(370 composite samples)
were tested for sulphites

亞硫酸鹽:研究結果
SULPHITES: STUDY RESULTS

大多數(91%)經化驗分析的食物未驗出亞硫酸鹽

- 共185種食物中，17種驗出亞硫酸鹽

共15個食物組別中，8組驗出亞硫酸鹽

Sulphites were not detected in the majority (91%) of TDS food items tested

- 17 out of 185 TDS food items were detected with sulphites

8 out of 15 TDS food groups were detected with sulphites

食物中驗出亞硫酸鹽的含量

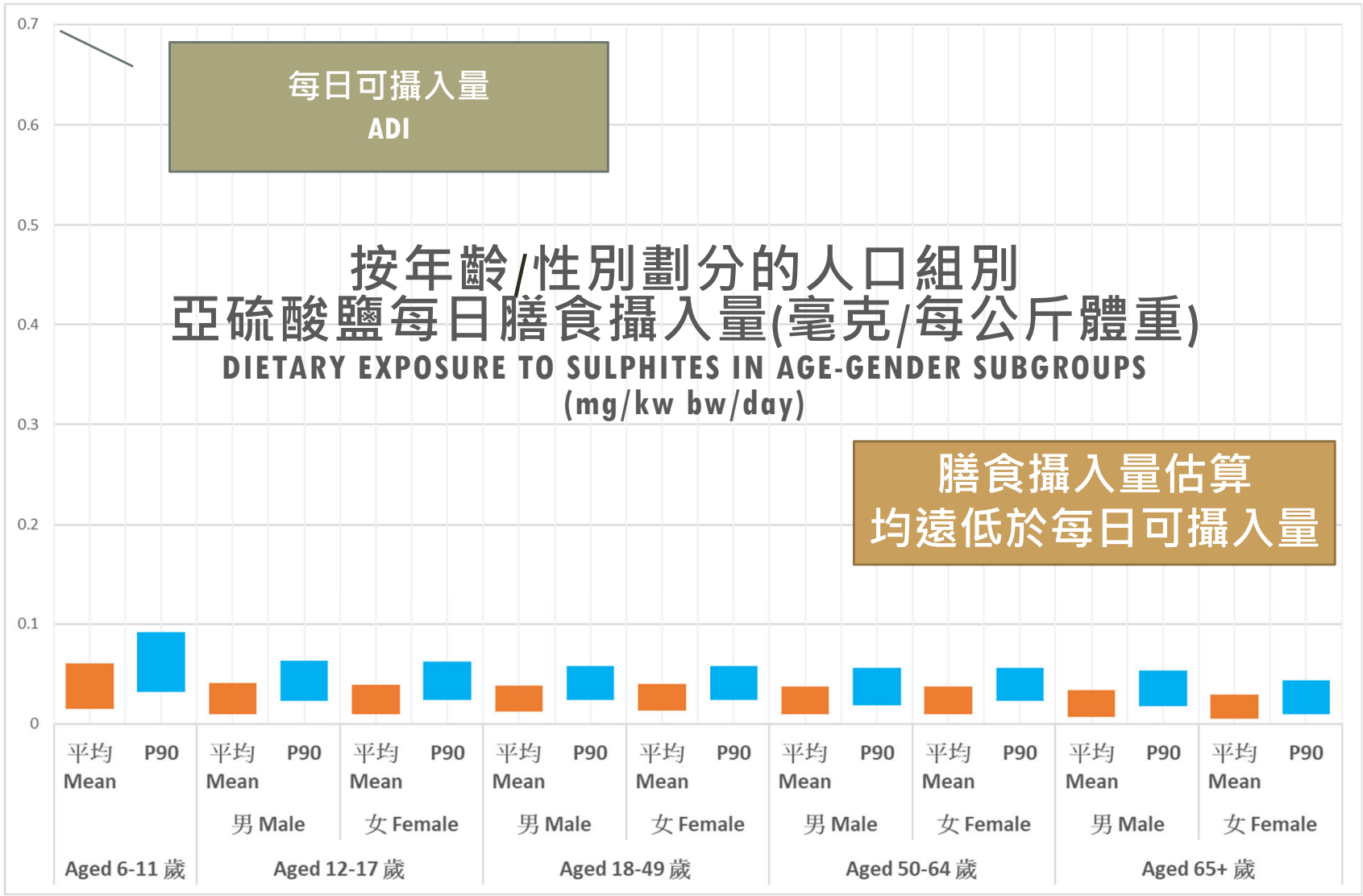
TDS FOOD ITEMS WITH DETECTABLE LEVELS OF SULPHITES

食物組別(組別內食物數目) TDS food group (No. of food item within food group)	驗出亞硫酸鹽的食物 TDS food item detected with sulphites	平均值(毫克/公斤)(下限-上限) Mean concentration (mg/kg)(LB-UB)
水果 Fruits (18)	乾果 Dried fruits	240
蔬菜及蔬菜製品 Vegetables and their products (42)	蘑菇 Mushroom, button	30
	醃製蔬菜 Preserved vegetables	23
	竹笙 Bamboo fungus	9.4
	蒜頭 Garlic	4.6
	乾冬菇 Mushroom, shiitake, dried	2.1
	竹筍 Bamboo shoot	1.9-2.4
酒精飲品 Beverages, alcoholic (2)	紅酒 / 白酒 Wine, red / white	27
魚類和海產及其製品 Fish, seafood and their products (24)	蝦 Shrimp / Prawn	10
	蝦米 / 蝦乾 Shrimp / Prawn, dried	5.4
	蠔 Oyster	4.5-5.0
	鹹魚 Salted fish	2.3
	魷魚 Squid	1.3-1.8
肉類、家禽和野味及其製品 Meat, poultry and game and their products (17)	牛肉 Beef	8.0-8.5
穀物及穀物製品 Cereals and their products (21)	粟米澱粉 Corn starch	2.1
混合食品 Mixed dishes (12)	蒸牛肉球點心 Dim sum, beef ball, steamed	1.0-1.5
糖類及甜點 Sugars and confectionery (5)	紅糖 (黃糖 / 黑糖) / 冰糖 Sugar, brown / rock	0.50-1.0

亞硫酸鹽的膳食攝入量:整體人口
DIETARY EXPOSURE TO SULPHITES: OVERALL POPULATION

	每日膳食攝入量（下限 - 上限）(毫克/每公斤體重) Dietary Exposure (LB-UB) (mg/kg bw/day)		佔每日可攝入量百分比（下限 - 上限） % ADI (LB-UB)	
	攝入量一般的消費者 Average consumers	攝入量高的消費者 High consumers	攝入量一般的消費者 Average consumers	攝入量高的消費者 High consumers
18歲以上 Aged 18+	0.010-0.037	0.021-0.055	1.5-5.3	3.0-7.9
6-17歲 Aged 6-17	0.012-0.051	0.028-0.078	1.8-7.3	3.9-11

膳食攝入量估算均遠低於每日可攝入量


每日可攝入量
ADI
按年齡/性別劃分的人口組別
亞硫酸鹽每日膳食攝入量(毫克/每公斤體重)
DIETARY EXPOSURE TO SULPHITES IN AGE-GENDER SUBGROUPS
(mg/kw bw/day)
膳食攝入量估算
均遠低於每日可攝入量
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
平均 Mean
P90
男 Male
女 Female
Aged 6-11 歲
Aged 12-17 歲
Aged 18-49 歲
Aged 50-64 歲
Aged 65+ 歲

與其他地方研究結果比較
COMPARISON WITH STUDY RESULTS FROM OTHER PLACES

與其他使用總膳食研究或類似方法研究*的結果比較

- 本港市民從膳食攝入亞硫酸鹽的分量屬於低端範圍

然而，因不同研究的方法有別，應謹慎比較不同研究的結果

(*包括澳洲、新西蘭、法國、愛爾蘭和台灣地區)

Comparing with dietary exposure estimates results obtained from studies* using TDS or similar methodology

- dietary exposure estimates of the Hong Kong population are at the low range

However, caution should be taken when comparing results from different studies with different methodology

(* including Australia, New Zealand, France, Ireland and the region of Taiwan)

結論
CONCLUSION

1. 大多數(91%)經化驗分析的食物均未驗出亞硫酸鹽
2. 乾果驗出的亞硫酸鹽平均含量最高（每公斤240 毫克），其他食物驗出的含量則低得多

1. Sulphites were not detected in the majority (91%) of TDS food items tested
2. “Dried fruits” was the TDS food item detected with the highest mean concentration of sulphites (240 mg/kg) whilst the levels detected in other food items were much lower

結論(二)
CONCLUSION (2)

3. 不論是本地成年人或較年輕群組，攝入量一般和攝入量高的消費者每日從膳食攝入亞硫酸鹽的分量，均遠低於亞硫酸鹽的每日可攝入量，顯示對健康構成影響的機會不大。

3. Estimated dietary exposure to sulphites of the average consumers and high consumers of the local adult and younger populations were well below the ADI allocated for sulphites, indicating a low chronic health concern.

給市民的建議
ADVICE TO THE PUBLIC

1. 應保持均衡飲食，以免因偏食某幾類食物而攝入過量亞硫酸鹽
2. 市民在購買預先包裝食品時，可參閱食物標籤知悉食品是否含有亞硫酸鹽
   - 對亞硫酸鹽有過敏反應的人士，更應詳細參閱食物標籤，以避免食用含有亞硫酸鹽的食品

1. The public is advised to maintain a balanced diet to avoid excessive exposure to sulphites from a small range of food
2. When purchasing prepackaged food products, consumers can refer to the food labels to know whether the products contain sulphites
   - susceptible individuals who are sensitive to sulphites should avoid foods that contain sulphites by paying close attention to the food labels

亞硫酸鹽的例子
EXAMPLES OF SULPHITES

國際編碼系統編號 INS No.	中文名稱	Name in English
220	二氧化硫	Sulphur dioxide
221	亞硫酸鈉	Sodium sulphite
222	亞硫酸氫鈉	Sodium hydrogen sulphite
223	焦亞硫酸鈉；偏亞硫酸鈉	Sodium metabisulphite
224	焦亞硫酸鉀；偏亞硫酸鉀	Potassium metabisulphite
225	亞硫酸鉀	Potassium sulphite
226	亞硫酸鈣	Calcium sulphite
227	亞硫酸氫鈣	Calcium hydrogen sulphite
228	亞硫酸氫鉀	Potassium bisulphite
539	硫代硫酸鈉	Sodium thiosulphate

給業界的建議
ADVICE TO TRADE

1. 遵從《食物內防腐劑規例》（第132BD章），有關規例訂明亞硫酸鹽可用於指明食物中的指明分量
2. 遵從《食物及藥物(成分組合及標籤)規例》（第132W章）關於標示亞硫酸鹽的標籤要求

1. Comply with the Preservatives in Food Regulation (Cap. 132BD) which specifies the maximum permitted levels of sulphites in specified foods
2. Comply with the Food and Drugs (Composition and Labelling) Regulations (Cap. 132W) which stipulates the labelling requirements with regard to sulphites

謝謝
THANK YOU