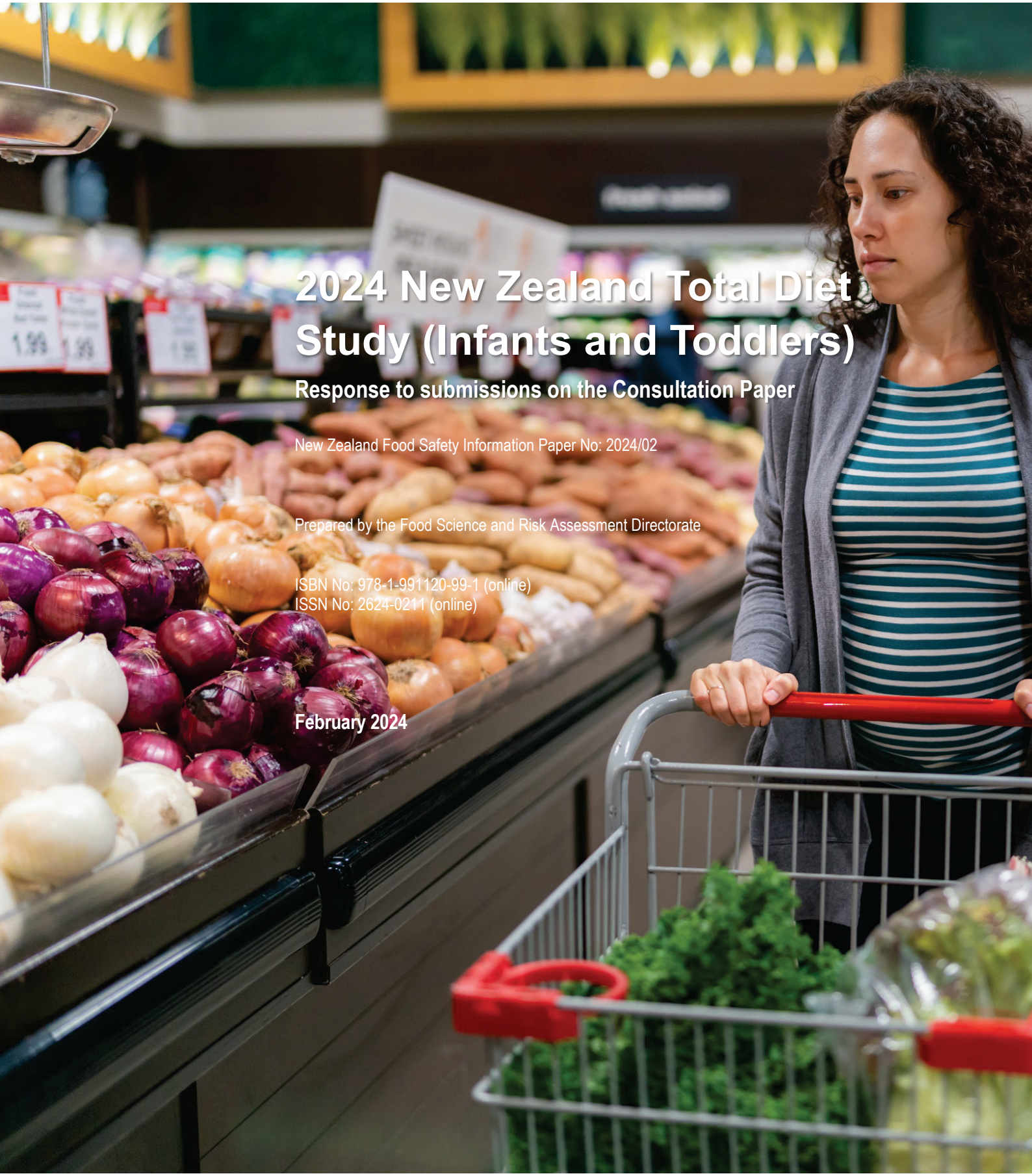
New Zealand Food Safety
Haumaru Kai Aotearoa



2024 New Zealand Total Diet Study (Infants and Toddlers)

Response to submissions on the Consultation Paper

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1 Summary of changes to the study protocol

A summary of the key changes to the 2024 New Zealand Total Diet Study (Infants and Toddlers), referred to forthwith as the 2024 NZTDS (Infants and Toddlers), following public consultation and consideration of the scientific evidence are as follows:

- Chemicals
    - packaging chemical polyfluoroalkyl substances (PFAS) and the nutrient iron have been added;
    - trace elements chromium and copper have been removed, as well as aflatoxin and folic acid; and
    - clarification that both nitrite and nitrate will be tested; and
    - clarification of compounds to be included within screens.
- Foods
    - corn-based breakfast cereal, cocoa, cinnamon, and silverbeet have been added;
    - modifications to foods included in the bread, fortified beverages and cheese categories have been made; and
    - prunes, corn chips, pancakes/pikelets, lentils and simmer sauce have been removed.

2 Background

The 2024 NZTDS (Infants and Toddlers) Consultation paper was released for public consultation on 15 November and closed on 15 December 2023. New Zealand Food Safety (NZFS) received 32 submissions: 17 from individual submitters, nine from food industry, three from research institutions, one from a government agency, one from an academic, and one from an environmental health agency.

The consultation paper, which presented a draft plan for the 2024 NZTDS (Infants and Toddlers), sought feedback on three main areas relating to:

- the chemicals selected for inclusion and whether these were sufficient,
- the list of foods selected and whether any should be added based on the diets of infants and toddlers, and
- the population groups selected for analysis and reporting.

We would like to thank those who provided a submission on the 2024 NZTDS (Infants and Toddlers). We appreciate the time taken to consider the consultation paper in depth and to provide feedback on the key areas of interest. In many cases, feedback was supported by scientific evidence.

In addition to the consultation process, NZFS is overseen by a Total Diet Study Governance Board, which is made up of industry, government, consumer, public health and Māori and Pasifika health and nutrition representatives. Feedback from this group has also been considered in the response to submissions.

NZFS has reviewed all submissions and attempted to address all key issues raised under each of the question areas.

As a result of the consultation, NZFS has made a number of changes to the final study outline, in particular in relation to the chemicals proposed for inclusion and the foods for analysis. The final project outline has been published and can be found here: https://www.mpi.govt.nz/dmsdocument/61177-New-Zealand-Food-Safety-2024-NZTDS-Final-project-outline

Section 2 below outlines the question areas, a summary of the issues raised in consultation, and our response.

3 Response to questions

3.1 Response to Question One

Do you consider that the current list of priority chemicals are sufficient? If not, please indicate which chemicals should be substituted and provide relevant data and/ or justification to support these recommended changes.

When prioritising analytes to include in the 2024 NZTDS (Infants and Toddlers), the following primary factors were considered:

a) Evidence of a child-specific hazard;
b) Potential dietary risk for New Zealanders; and
c) International evidence regarding changing exposures or dietary risk.

Other secondary considerations were:

d) Consideration of emerging and high priority chemical issues overseas;
e) Consistency with previous NZTDS, especially where risks had been identified;
f) Perception of risk; and
g) Cost efficiency of the analytical method.

It is important that the analytical methods used in the NZTDS cover the widest possible range of priority chemicals, while providing a balanced weighting across the core chemical areas: agricultural chemicals, contaminants, and nutrients. In addition to the NZTDS, MPI implements several food and chemical monitoring programmes. Depending on the research question, a survey may be better suited to understand the absence, presence, extent, distribution and risk of a particular chemical or commodity of interest.

Of the 32 submissions received, NZFS received 28 submissions on the draft priority chemicals. Overall, feedback provided related to extending the list of agricultural chemicals (e.g. glyphosate and chlorates), contaminants (polybrominated diphenyl ethers (PBDEs), polyfluoroalkyl substances (PFAS), dioxins and dioxin-like polychlorinated biphenyls (PCBs) and nutrients (calcium, iron, and vitamin B12). Further, suggestions were made to include chemical such as microplastics, phytoestrogens, and radioactive isotopes. Some suggestions questioned the inclusion or consideration of contaminants (aflatoxins, phthalates, and methylmercury).

An overview of the submissions and our response to question one is provided below.

3.1.1 Agricultural compounds

Glyphosate

Recommended inclusion of glyphosate was raised by 13 individual submitters, based on significant health concerns.

NZFS appreciate submitters' concerns around the health impacts of glyphosate, specifically in regard to the 2015 International Agency for Research on Cancer (IARC) opinion classifying glyphosate as a probable human carcinogen (Type 2A).

NZFS reviewed the IARC report in July 2015 (IARC, 2015) and concluded that IARC had done a hazard assessment and not a risk assessment. This means that IARC had looked at whether glyphosate exposure could lead to cancer under any circumstances, whether those circumstances were realistic or not. For example, if the dose required is not a credible dose that humans may be likely to be exposed to.

NZFS's view is that the IARC data does not indicate any credible risk to users of glyphosate (for example, farmers, home gardeners), or to consumers of produce with residues of glyphosate that comply with the New Zealand maximum residue levels (MRLs).

Glyphosate is a non-selective herbicide, meaning it causes damage to all plants, not just weeds. As a result, its use in the New Zealand food production chain is limited; farmers do not want to damage their edible crops. This means that glyphosate residues in food crops should be minimal in most situations.

The exception is in the context of glyphosate-resistant GM crops – whilst they may be commonly grown in some countries, GM crops are not permitted to be grown in New Zealand. We note that many documents cited by submitters are specific to an American context. Environmental exposure outside of dietary intake (e.g., from roadside weed spraying) is out of scope for the 2024 NZTDS (Infants and Toddlers).

A number of countries such as Australia, USA, Canada, and more recently the European Union have either recently reviewed glyphosate, or have undertaken a risk assessment and have concluded that glyphosate is unlikely to pose a carcinogenic risk to humans. In the case of the European Union, it recently renewed its approval for 10 years from 16 December 2023. This decision has been based on the assessment made by the European Food Safety Authority (EFSA) of the impact of glyphosate on the health of humans, animals, and the environment. It did not identify critical areas of concern that would prevent a renewal of approval.

Hence, given the large body of evidence, glyphosate was not assigned priority status in comparison with other possible analytes. NZFS has reached similar conclusions with respect to food safety. We will continue to review any new evidence in the future.

Hazardous substances, such as agricultural chemicals, must be approved by the Environmental Protection Authority (EPA), before they can be used in New Zealand. A substance can only be approved if the positive effects (the benefits) outweigh the adverse effects (the risks and costs). To assess the risks to human health, the environment, people and communities, Māori culture, and economy, the EPA consider scientific data and evidence, economic information, grass-roots and local information, as well as cultural perspectives. Further information on the EPA's assessment of hazardous substances, can be found here: Hazardous substances and the EPA | EPA

Chlorates
Inclusion of chlorates was raised by industry, mainly based on new MRLs and surveys underway in Europe, to ensure that New Zealand does not have levels of concern in infant based foods.

NZFS considered its inclusion as part of its prioritisation exercise, however the overseas and domestic evidence for chlorate exposures suggests that the magnitude of exposures do not rise to the level of significant health risk potential. MPI has set chemical limits for chlorate in milk, infant formula and follow on formula. MPI verifies conformance to these limits through monitoring in the National Chemical Contaminants Programme (NCCP). NZFS considers that chlorate monitoring through the NCCP for milk contamination is a sufficient mechanism at this time to inform any potential dietary exposures to infants and children.

3.1.2 Contaminants

Polybrominated diphenyl ethers (PBDEs)
Epidemiological evidence around the association between PBDEs impacting mental and physical development in children was raised. NZFS considered its inclusion as part of its prioritisation exercise and now following consultation.

The evidence from international TDS indicates a low level of concern, and New Zealand is not known to have comparatively higher levels of these compounds in commerce or in the environment. Further, the applications of these compounds in commercial goods have been or are being phased out internationally, mitigating ongoing exposures via the global food supply.

The 2011 European Food Safety Authority (EFSA) reference cited in the submission predates significant regulatory efforts to mitigate environmental exposures to PBDEs, through bans on uses in furniture foams as flame retardants. These changes were placed into effect in the USA, Australia, and New Zealand. Urinary PBDE concentrations have been shown to be decreasing in a study on urine

samples from Australia (Drage et al., 2019). There is no evidence for any increased use of PBDEs that would alter the expected trend in decreasing environmental concentrations worldwide.

Dioxins and dioxin-like polychlorinated biphenyls (PCBs)
Inclusion of dioxins and dioxin-like PCBs was raised, based on a 2018 EFSA evaluation of these compounds concluding the critical effect was on semen quality, following pre-natal and post-natal exposure.

Consideration was given to including dioxins and dioxin-like PCBs. While it is noted there are developmental toxicity hazard considerations with dioxins, the environmental levels of dioxins and PCBs in New Zealand are known from several large studies, to be comparatively low by international standards. The MPI NCCP annually monitors milk and high-fat dairy products to confirm the very low levels of these compounds as set out in international standards.

Per- and polyfluoroalkyl substances (PFAS)
Six submitters, including from government, industry, an environmental health group, and a research institution, raised inclusion of PFAS in the 2024 NZTDS (Infants and Toddlers) based on recent international evidence on the adverse health effects on the immune system, wide use in packaging and the pervasiveness of PFAS in the global environment.

Inclusion of PFAS chemicals were considered as part of our chemical prioritisation process, however, originally were not in the highest priority, which also factored in cost.

We have revised our conclusion, based on the submissions received as well as the very recent World Health Organization and International Agency for Research on Cancer (IARC) upgraded cancer evaluation of perfluorooctanoic acid (PFOA) (Zahm et al, 2023).

PFAS will now be included in two quarterly rounds of the 2024 NZTDS (Infants and Toddlers). PFAS should not be a seasonal contaminant, and therefore by including in two of four quarterly rounds, we can ensure we can obtain the data, within the overall budget.

The existing data on PFAS concentrations in foods from New Zealand and Australia have shown that the concentrations have largely been at undetectably low levels, and are unevenly distributed in those foods where rare detections are found.

We agree that the hazardous properties of some PFAS chemicals, combined with their long environmental half-life, warrants updated awareness of their presence in the food supply. While it is debatable whether the TDS is the best mechanism to maintain such awareness, we have concluded that PFAS should be included in the 2024 NZTDS (Infants and Toddlers).

We are also aware that New Zealand food packaging companies have been voluntarily phasing out PFAS that has been intentionally added into food packaging materials as of December 2023.

The occurrence and magnitude of PFAS in the 27th Australian Total Diet Study (FSANZ, 2019) were evaluated in 2021 and levels in the diet were concluded to be very low. Consistent with this finding, the 2016 NZTDS examined selected foods for the presence of PFAS and similarly found low levels in only a small number of foods.

Aluminium
Additional support for inclusion of this metal was provided by one industry submitter, which will support risk assessment on aluminium in infant formula in the future.

Thallium
Additional support was provided for inclusion of this metal by one industry submitter; helping us to better understand exposures and risks to infants and toddlers.

Methylmercury
Concerns regarding consideration, calculation, and interpretation of infant and toddler dietary exposures to methylmercury was raised by one research institution, particularly based on specific toxicity to child neurodevelopment in utero, rather than post-natal exposure.

NZFS considers methylmercury is relevant to the developmental processes in this age group. The use of the Provisional Tolerable Weekly Intake (PWTI) for methylmercury is expected to provide protection to the 0-4 year old age group. Methylmercury exposure is expected to be relevant to developing nervous systems and other targets in children (National Research Council, 2000).

NZFS does not propose to directly measure methylmercury, but only infer its exposure as a percentage of total mercury. There is no material cost to assessing its exposure and risk, which we will assess against both inorganic and methylmercury health-based guidance values. We also note that consideration of mercury and methylmercury in the diets of New Zealand infants and children has been part of previous NZTDS.

Arsenic
Clarification was sought by one research instution submitter on which foods will be selected for analysis.

It is proposed that all foods are tested for total arsenic, however only a select number of foods will be tested for inorganic arsenic. These foods include: all infant foods, products containing rice or seafood, and yeast-based extracts. The samples will be separately analysed for inorganic arsenic. Methyl arsonate and dimethylarsinate will be speciated and reported in the inorganic arsenic testing.

Nitrates/ nitrites
We propose analysing for both nitrate and nitrites in a select number of foods. Nitrate is mainly sourced through the diet via the consumption of fruit and vegetables, which take up nitrate from soils naturally. Nitrites are found as food additives in some processed cured meats. Foods to be tested for nitrates and nitrites include all vegetables and legumes, non-alcoholic drinks, fruits, infant foods, dairy products and their alternatives, and processed meats.

In response to a submitter's comments regarding forms for analysis, our intention is to capture 'nitrate' but this will not distinguish between forms (i.e., potassium compared to sodium nitrate).

Mycotoxins (aflatoxins and deoxynivalenol (DON))
Concerns were raised by two research institute submitters as to whether the TDS provided the best methodology for assessing exposure to the two mycotoxins: aflatoxins and deoxynivalenol (DON). It was noted that if DON was to be included in the 2024 NZTDS (Infants and Toddlers) it will be important to ensure that the analyses included the 'masked' forms of DON, particularly the acetylated and glucosylated plant metabolites.

Although one submitter noted that the first French infant TDS did not detect aflatoxins, it did find significant levels of DON. It also concluded that the limit of detection limitations resulted in their interpretation of aflatoxin exposures being that a risk could not be excluded (Vin et al., 2020).

Mycotoxins have not been included in an NZTDS to date. Internationally, mycotoxins are of increasing concern due to changing climates and fungal growth conditions in various parts of the world. We consider the TDS methodology to be appropriate, as it is proposed to analyse only those foods (primarily cereals and grains) that would be most likely to contain DON and the results will help understand if DON is a food contaminant of concern in New Zealand. These data will be used in dietary exposure assessments to compare internationally. Depending on the outcomes of this study, a follow up targeted survey of selected foods could be proposed. Dietary consumption data from this age group can further help us form a basis for risk assessment of a typical child's diet.

Aflatoxins were rarely detected in common foods in the second French TDS (Sirot et al., 2013), but were found to a considerable degree in a survey of infant foods in Iran (Bashiry et al., 2021), and also in infant foods in Spain (Hererra et al., 2019). We are considering these developments for possible targeted surveys of aflatoxins in the future but will exclude from the 2024 NZTDS (Infants and Toddlers).

We note and appreciate the suggestion to include the derivatives of DON to ensure that the complete exposure profile of these chemicals can be assessed.

In response to this submission, we will be removing aflatoxins from the 2024 NZTDS (Infants and Toddlers) and will consider a more targeted survey of selected foods for future analysis. We will retain testing for DON in the 2024 NZTDS (Infants and Toddlers).

Bisphenol – A

One research institution noted that the studies on packaging chemicals (BPA) cited in the proposal indicate that they are low-risk (also based on phasing out), and that chemical analysis may be more appropriately addressed in a specifically targeted study. It was also suggested that if it is intended that 'replacement bisphenols' were to be included, it should be more clearly specified.

NZFS notes that existing information on BPA in New Zealand foods is quite limited and dated. It is our intention, as stated in the consultation document, to include bisphenol replacements in the analyses. To clarify, ten bisphenol compounds will be analysed in a selection of foods which come into contact with polycarbonate plastics or epoxy resins – the likely sources of bisphenols or their replacements.

While we do not have authoritative health-based guidance values for each of the substitute substances, the toxicology and epidemiology literature on these substances continues to emerge, and measuring these analytes will provide exposure information to help guide prioritisation of any future risk assessments.

There have been numerous re-evaluations of bisphenol exposures, hazards, and risks internationally over the past 10 years. We are intending to analyse a targeted set of foods that are most likely to have bisphenols in the 2024 NZTDS (Infants and Toddlers) (not all foods).

Phthalates

Concerns regarding calculation and interpretation of infant and toddler dietary exposures to phthalates was raised by one research institution, particularly based on critical toxicological findings of reproductive and neurobehavioral development effects seen in utero, rather than neonatal or early childhood exposure.

Phthalates as toxicants act through a mode of action that includes oxidative damage to the testes and perturbation of androgen receptor signalling activity (Zhao et al., 2022; Beg et al., 2020). While (exclusively) early post-natal exposure studies are rare, the mode of action is expected to be relevant to the early post-natal developmental period and some animal studies and human biomonitoring data support this consideration. There are numerous associative large human biomonitoring studies that show phthalate metabolites in urine associated with various disease states, including behaviour, sexual maturation, diabetes, asthma, and obesity.

A growing body of literature is finding consistent associations between both prenatal and postnatal phthalate exposures and a wide spectrum of adverse neurodevelopmental, sexual maturation, and immunological outcomes (Jankowska et al., 2019; Ku et al., 2015; Ejaredar et al., 2015; Pallotti et al., 2020; Radke et al., 2020; Minatoya et al., 2021; Ham et al., 2024).

The ability of epidemiological studies to segregate postnatal vs prenatal exposures and effects at later stages is limited in most cases, due to difficulties in strictly separating lactational exposures from in utero exposures. We consider that a PTWI based on protection of foetal development, is also of potential relevance to postnatal development.

As such, it is proposed that phthalates continue to be included in the 2024 NZTDS (Infants and Toddlers). 15 phthalates will be included in the 2024 NZTDS (Infants and Toddlers), a selection of foods will be analysed for these chemicals.

3.1.3 Nutrients and trace elements

Chromium and copper
One submitter noted that collecting information on chromium and copper concentrations in foods is useful, enabling determining nutritional requirements, as well as indicating any potential regional or crop-specific variations that in turn may indicate elevated soil concentrations. Unfortunately, with the changes in the prioritisation of chemicals to include in the 2024 NZTDS (Infants and Toddlers), it is no longer feasible to include chromium and copper in the survey.

Iron
Three industry submitters recommended the inclusion of iron in the study, noting its importance as a potential dietary risk for infants and young children in this age group.

The First Foods New Zealand (FFNZ) (University of Otago, 2023) and Young Foods New Zealand (YFNZ) studies will be publishing their results on iron intakes for both studies, and iron status for the FFNZ study. It is anticipated that this data will be published by the research team in early 2024. This will provide the important update to New Zealand data on iron intakes in this population group and levels of inadequacy and insufficiency, which as the submitter has identified will be important information for New Zealand.

NZFS agrees that iron is a potential dietary risk for this age group and that it is important to monitor any potential changes in the food supply related to this nutrient. There is work in the trans-Tasman system exploring options to improve the food composition of commercial foods for this age group, and iron has been identified as a nutrient of interest. Furthermore, there is some emerging evidence that climate change may impact on the levels of zinc and iron in plant foods and will be an important area to monitor any changes in the food supply.

Based on the submissions received, NZFS will include iron as an element to monitor in the 2024 NZTDS (Infants and Toddlers), this will be measured in all foods.

Calcium
An industry submitter proposed that calcium should be included as there is a lack of up-to-date nutrient intake data since the last National Children's Nutrition Survey.

The FFNZ and YFNZ studies have included calcium in their food composition database. It is anticipated that this data will be published by the research team in the near future. This will provide an important update to New Zealand data on calcium intakes in this population group and levels of inadequacy, which as the submitter has identified will be important information for New Zealand.

As calcium is a nutrient which is not considered to be vary based on geographic conditions and is not part of a mandatory fortification programme it is not considered a priority nutrient for the purpose of the total diet study.

Folic acid
Folic acid was on the proposed list for inclusion in the 2024 NZTDS (Infants and Toddlers), based on the mandatory fortification of bread with folic acid introduced in August 2023.

One research institution supported its inclusion and proposed that folate is also included in addition to folic acid to provide a better overview of the contribution of folate and folic acid to the adequacy of the diets of this population group.

Since consultation, NZFS has had approval to conduct a separate focused monitoring study of folic acid in bread products. Information from this study will be used to estimate dietary exposures to folic acid outside of the 2024 NZTDS (Infants and Toddlers) as part of our commitment to monitoring mandatory fortification.

Vitamin B12
An academic proposed that vitamin B12 should be included as it is important in the context of folic acid metabolism and is a key nutrient, particularly in relation to changing dietary patterns to increase plant foods and the increase in vitamin B12 insufficiency as measured in the previous Adult Nutrition Survey.

The FFNZ and YFNZ studies have included vitamin B12 in their food composition database. It is anticipated that this data will be published by the research team in the near future. This will provide the important update to New Zealand data on vitamin B12 intakes in this population group and levels of inadequacy.

As vitamin B12 is a nutrient which is not considered to be vary based on geographic conditions and is not part of mandatory fortification programme it is not considered a priority nutrient for the purpose of the total diet study. Furthermore, folic acid is no longer going to be included in the 2024 NZTDS (Infants and Toddlers).

3.1.4 Other chemicals

Phytoestrogens
One industry submitter suggested including phytoestrogens, particularly since plant-based (e.g., soy) milk substitutes are proposed in the food list and there is evidence that phytoestrogens are endocrine disruptors may affect infant and toddler development.

We agree that data on phytoestrogens in plant-based milks and other parts of the New Zealand infant diet would be useful. We considered phytoestrogens as part of our prioritisation process however the number of related foods would be small, and we consider that it would be better suited to a targeted survey.

Microplastics
Two individual submitters and one government submitter raised microplastics as a chemical worthy of consideration.

Microplastics are an emerging area of interest for New Zealand Food Safety, and research is currently underway to determine the levels of microplastics in the New Zealand diet.

Microplastics have been found in rivers and lakes worldwide, but the main focus of research has been on looking for them in the sea where they can enter seafood (such as fish, shrimp, and shellfish). They have also been found in other foods like honey, beer, and table salt.

Testing methods for microplastics are currently limited to only the larger sized particles, and there is no standardised analytical method available meaning there is little available information quantifying the presence of nanoplastics in the environment and food. As such microplastics will not be analysed for in the 2024 NZTDS (Infants and Toddlers).

Radioactive isotopes
One individual submitter raised radioactive isotopes for consideration.

In 2013, NZFS commissioned a survey to establish the levels of 13 radionuclides in the New Zealand diet (Pearson et al., 2016) in 40 common food commodities. NZFS also commissioned a follow up survey of radionuclides in New Zealand seafood species to specifically assess the risk of seafood consumption after the Fukushima Daiichi Nuclear Power Plant incident.

The survey covered fin fish, crustaceans, and molluscs sampled over six fishery management areas, giving a large spatial coverage of New Zealand's economic exclusion zone, and concluded that anthropogenic radionuclides from Fukushima-Daiichi wastewater has not contaminated the migratory pelagic species such as tuna or regional shellfish in New Zealand. It concluded a negligible dietary risk for New Zealand consumers through seafood.

Based on the above, NZFS will not include analysis of radioactive isotopes in the 2024 NZTDS (Infants and Toddlers).

Changes to the chemical list are summarised in Table One below.

Table One. Proposed changes to the chemical list

	Agricultural chemicals	Contaminants	Nutrients
Retained	Carbamates Dithiocarbamates Neonicitinoids Organochlorines Organophosphates Triazoles A range of other chemical classes including insecticides, fungicides, and herbicides	Aluminium Antimony Arsenic (inorganic) Arsenic (total) Bisphenols Cadmium Deoxynivalenol* Lead Mercury (inorganic) Nitrite and Nitrate Phthalates Thallium Tin	Iodine Selenium Sodium Zinc
Removed	NA	Aflatoxin*	Folic acid Chromium^ Copper^
Added	NA	Polyfluoroalkyl substances (PFAS)	Iron

*Of the two mycotoxins, aflatoxin was removed and deoxynivalenol retained
^Chromium and copper will no longer be included in the element screen as previously suggested

3.2 Response to Question Two

Do you consider there are any foods that should be included or excluded based on the dietary consumption patterns of infants and toddlers? If so, please provide data to identify and justify any recommended changes.

Of the 32 submissions received, NZFS received 18 submissions related to the foods proposed in the study.

In general, submitters stated the proposed foods appeared to be appropriate and rigorous. Some suggestions were made for amendments based on submitters views on the diets of infants and young children and potential high-risk foods that were not included. An overview of the submissions and our response to question two is provided below, in addition to changes that NZFS has proposed.

Breakfast cereal, corn variant: One submitter suggested that a corn variant should be included due to the different risks associated with corn-based products. NZFS has accepted this suggestion and a corn variant will be sampled for in the 2024 NZTDS (Infants and Toddlers).

Breast milk and maternal diet: Two submitters commented on the inclusion of breastmilk. One has suggested that in future studies, the inclusion of human milk samples would be beneficial, particularly in consideration for estimating exposures to the 0-6 month age group. The second submission suggested that the breastmilk composition varies according to maternal status, in particular whether the mother is vegetarian. NZFS will be utilising data from the FFNZ data where they have analysed the collected breastmilk samples and created a composite. As the NZTDS creates composites of all foods to provide an average nutrient profile for the nutrients included, this approach will be taken for the dietary exposure for the nutrients included in the TDS. Unfortunately, we do not have access to

data on the maternal diet and cannot include any modelling of the impact of vegetarianism in the 2024 NZTDS (Infants and Toddlers).

Cheese: One submitter suggested that processed cheese should be included in the food list as it is commonly consumed. NZFS reviewed the intake data available and agrees that processed cheeses were consumed in sufficient amounts to warrant inclusion. Processed cheese has been substituted for ripened cheese in the food list.

Chocolate & cocoa: One submitter requested the inclusion of cocoa powder due to the potential for contamination of lead. NZFS will continue to include chocolate in the food list, in addition to chocolate biscuits, cocoa as an ingredient will also be included. Although cocoa is consumed in small amounts, it was a frequently consumed ingredient when the FFNZ and YFNZ data was analysed and is a potential source of lead.

Corn chips: NZFS was required to reduce the food list to enable changes to be made based on the submissions received. Upon review, a number of savoury snacks were already included in the food list, and corn chips were the least frequently consumed of these snack types. Therefore, it was determined to be removed from the food list.

Dairy milk alternatives: Two submitters questioned the dairy milk alternative foods which lists soy milk and cereal/nut milk to be included in the food list. One submitter questioned whether there was sufficient variety based on the increase in availability of plant-based milks for sale. The other submitter noted that these plant-based milks are not recommended for the infant and young child population group and are required through the Food Standards Code to have the statement: *"not suitable as a complete milk replacement for children under 5 years old"* on the label. Despite this recommendation and label requirement on foods, the YFNZ study found a significant number of young children consuming oat or almond milk at comparable levels to those consuming soy milk. As such NZFS will retain two dairy milk alternatives on the food list: soy milk and cereal/nut milk.

Food common for Pasifika: One submitter highlighted the common consumption of corned beef, taro and tea in the diets of Pasifika and queried their exclusion. It is acknowledged that these foods are all included in previous TDS, particularly for this group. NZFS reviewed the FFNZ and YFNZ data for consumption of each of these foods. Despite the diverse sample of these studies, of which 10.3% were Pasifika children, very few reported consuming these foods in the study period. It is important to consider the continued inclusion of these foods in future TDS for adults and children as they may be more frequently consumed in the older age ranges.

Fortified beverages: One submitter suggested that fortified malt-based beverages were excluded from the food list as they are targeted to children over four years of age. Fortified malt-based beverages were the most commonly consumed non-alcoholic beverages, other than water, by the older infants and young children in the FFNZ and YFNZ studies. NZFS will continue to include fortified malt-based beverages but has expanded the range of beverages to include a slightly broader range of products. The food will now be referred to as: powdered drink bases to include both malt/chocolate variants.

Herbs, spices, and condiments: Three submissions highlighted the importance of including herbs and spices in the food list. NZFS has conducted targeted surveys of spices in the past. Although herbs and spices are consumed in small amounts, cinnamon in particular was consumed by large number of infants and toddlers in the study, as such it will be added as a spice to the food list, based on frequency of consumption and the potential risk of contamination of lead which has been found internationally. A number of condiments will be included and any prepackaged food containing cinnamon (e.g., baby food fruit purees) will be included in the study.

Infant/follow-on formula: Two submitters questioned how many different protein types will be included and whether there will be differentiation between dairy and plant based infant formula as their

contaminants and nutrients will differ. NZFS will be including one food type for infant and follow-on formula, this will include the most commonly consumed formula types. As there are still very limited number of plant-based infant/follow-on formulas on the New Zealand market it was not possible to have a separate food type for this type of formula.

Lentils, dried: NZFS was required to reduce the food list to enable changes to be made based on the submissions received. Upon review, it was determined that lentils could be removed from the food list as these were the less frequently consumed than canned legumes in the legumes and pulses category.

Pancakes/pikelets: Pancakes/pikelets were proposed to be included in the food list based on the high frequency that there were reported as consumed by the target population. In the process of developing the sampling plan, it was identified that these foods were typically homemade and often contained a variety of additional ingredients (e.g., banana, blueberry) rather than purchased. As such it was determined to be more appropriate to ensure that the ingredients that were used in the home are analysed, rather than a store purchased pancake.

Pork and pork products: One submitter suggested that a further range of pork products are included. The 2024 NZTDS (Infants and Toddlers) already includes four pork products which is considered sufficient, these include: ham, bacon, pork, and sausages.

Prune, dried: NZFS was required to reduce the food list to enable changes to be made based on the submissions received. Upon review, it was determined that dried prunes could be removed as they were less frequently consumed and a more frequently consumed dried fruit product was already included on the food list.

Salt: Two submitters supported the inclusion of salt, particularly to analyse this for lead and iodine. The 2024 NZTDS (Infants and Toddlers) will include salt samples for analysis.

Simmer sauce, bottled: Simmer sauces were proposed to be included in the food list based on the high frequency of some meal types (e.g Bolognese) by the target population. In the process of developing the sampling plan, it was identified that these foods were typically homemade and often contained a variety of additional ingredients rather than purchased simmer sauces. As such it was determined to be more appropriate to ensure that the ingredients that were used in the home are analysed, rather than a store purchased simmer sauce.

Silver beet: two submitters questioned the exclusion of silver beet from the 2024 NZTDS (Infants and Toddlers) food list. NZFS has addressed this through a combined: spinach/silver beet food type for inclusion. This is the approach taken in the 2016 NZTDS.

Wild game: One submitter suggested the inclusion of wild game as there can be high levels of lead in wild game. While it is acknowledged that wild game would be important to include for this rationale, the food consumption data that we will be using to model the results on has very few consumers of wild game, as such it will not be included in the 2024 NZTDS (Infants and Toddlers). A future total diet study for adults and children should consider the inclusion of wild game.

Summary

With the proposed changes to the project outline to include more chemicals and suggestions from submitters for new foods, some changes have had to be made to the number of foods collected. A slightly reduced food list has been established, from 120 foods proposed in the consultation, a total of 117 foods have been finalised for inclusion. Please refer to Table Two below.

Table Two. Summary of changes to the food list

Removed foods	• Prune, dried • Corn chips • Pancakes/pikelets • Simmer sauce, bottled • Lentils, dried
Modified foods	• Bread wholemeal: merged with bread, mixed grain • Fortified beverages (malt based) amended to powdered drinks, malt or chocolate-based • Silver beet: merged with spinach • Cheese, soft unripened, amended to processed cheese
Added foods	• Breakfast cereal, corn-based • Cocoa • Cinnamon

3.3 Response to Question Three

Do you consider there are any specific population groups (within the 6-month to 4-year old age group) that should be included in the 2024 NZTDS based on significant differences in intake patterns? If so, please provide data to identify and justify any recommended changes.

Of the 32 submissions received, NZFS received eight submissions related to specific population groups.

An overview of the submissions and our response to question three is provided below.

An academic submitter suggested that South Asian or vegetarian population groups should be included, mainly due to poor Vitamin B12 intakes. In undertaking dietary exposure estimated for certain population groups, the size of the population groups needs to be large enough to report statistical differences. With these specific groups in mind, we will unlikely be able to report on these groups with confidence. In addition to this, we do not have data on whether the infants or young children were following a vegetarian diet. Further Vitamin B12 will not be included in the study for the reasons outlines in section 2.13.

One industry submitter noted it would be beneficial if the 0-6 month age group is included in the future. The submitter acknowledged the FFNZ and YFNZ studies the NZTDS rely on include the six-month to four year old age group. Previous NZTDS have included those six months and over, noting that exclusive breastfeeding is recommended by the Ministry of Health (2021) until babies are around six months of age.

One industry submitter recommended considering those with allergies as a population group. Although there are a number of common foods allergens, it would not be appropriate to try and determine specific diets for those with allergens. The purpose of the NZTDS is to understand exposure to chemicals from the food supply, not the exposure of individuals to specific food allergens.

An individual submitter raised that it would be good to include children from different economic and cultural backgrounds. The FFNZ and YFNZ studies were a diverse sample; 22.5% Māori, 10.3% Pacific, 13.7% Asian, 51.1% European; and almost one third of the households had high socio-economic deprivation.

Based on the above response, no change has been made to the population groups to be reported on as part of the 2024 NZTDS (Infants and Toddlers).

3.4 Response to Question Four

Do you have any comments regarding any other aspect of the consultation paper?

Of the 32 submissions received, NZFS received 15 submissions on this section. An overview of the submissions and our response to question four is provided below.

3.4.1 General feedback

Seven submitters provided general comments on the consultation paper. Five industry submitters expressed support for undertaking the 2024 NZTDS (Infants and Toddlers), four of which specifically highlighted its support for the infant and toddler population. One of these submitters noted the importance of carefully managing communication of results on this vulnerable population group. One submitter reflected the importance of educating parents on what chemicals are in foods.

The NZTDS will aim to identify the level of certain chemicals in foods and estimate how much of these chemicals infants and toddlers get from the foods they eat. Communicating results in a way that ensures they can be interpreted appropriately will be important.

One research institution and an environmental health group expressed concern with the infrequency of the NZTDS, when they were historically every five years. Further, they consider it unacceptable that with focus on infants and toddlers, that contaminants intakes of older children, adolescents and adults will not be calculated. It was suggested to sample and test the same range of foods as tested in the last NZTDS and add in the new foods for infants and toddlers as proposed in the discussion paper.

In response, we consider that dietary patterns have changed, and it is not appropriate to undertake dietary exposure estimates using food consumption data that is now up to two decades old. We do note however that many of the foods in the study are similar to that in the 2016 NZTDS, and chemical levels between 2016 and 2024 will be able to be compared for certain foods. Refer to section 2.45 for further discussion on the National Nutrition Survey.

3.4.2 Regions

One submitter questioned how the regions were determined, and whether it would be useful to sample foods in rural areas where water contamination is a problem.

The regions proposed are based on those historically used in past NZTDS but also to ensure a combination of agricultural/ horticultural growing areas and urban centres across both the North and South Islands. Auckland– largest city in North Island; Christchurch – largest city in South Island; and Dunedin, where soil concentrations of selenium and iodine are known to be low. Palmerston North has been selected this year over Napier due to the February 2023 flooding events which is likely to be still impacted by this event. Other monitoring programmes may be better suited to target specific rural communities.

3.4.3 Dietary exposure

One research institution supported the use of individual dietary records from the FFNZ and YFNZ that will provide greater opportunities to investigate the variability in dietary exposure, compared to the 14-day simulated typical diets. They also raised challenges with interpreting and communicating exceedances of related health-based guidance values (HBGVs) i.e., an exceedance of HBGV for less than lifetime interval is not necessarily a cause for concern and will require consideration of the detailed toxicology of the associated analyte.

We agree that any exceedance of an HBGV based on chronic daily dose may not necessarily indicate an adverse health effect will occur. We intend to utilise standard risk assessment methodology to characterise these risks, in line with international best practice. Chronic timeframes for toxicity can be defined in various ways, and interpretation will depend on each type of toxicologic pathology for a given substance. A lifelong exposure is not necessary to invoke chronic risks for most contaminants.

3.4.4 Limits of detection (LOD)

One research institution raised whether the limits of detection (LOD) for individual analytes are fit for purpose. We acknowledge that this is an issue across all TDS internationally, including the proposed study.

All exposure assessments that utilise LOD conventions for assigned values will be done with appropriate caveats, especially where detection limits affect the conclusions. The laboratory will be using accredited analytical methods wherever applicable, and scientifically valid techniques throughout. We believe the LOD will be fit for purpose.

3.4.5 National Nutrition Survey

Three submitters (industry, environmental health, and a research institution) noted that part of the rationale to focus on the infant and young child age group was a result of the absence of a recent National Nutrition Survey. It was noted by these submitters that although this survey is not under the jurisdiction of NZFS, that NZFS work with Ministry of Health to escalate the need for a comprehensive National Nutrition Survey and to coordinate the timing of these surveys so that a full NZTDS can be conducted in the future.

NZFS notes the importance of the National Nutrition Survey, for the NZTDS and as a critical tool to monitor the food supply and nutrition of the New Zealand population. NZFS will continue to engage with the Ministry of Health to support the development and implementation of a future National Nutrition Survey.

3.4.6 First Foods New Zealand & Young Foods New Zealand data

Two submitters have queried the availability and access to the data from the FFNZ and YFNZ studies. NZFS has access to the data sets, which were used to develop the food list and will be used for dietary exposure assessments. Research articles on these two studies are starting to become available from study authors. A list of publications from the research group can be found on their website: www.otago.ac.nz/diabetes/research-at-edgar-diabetes-and-obesity-research/publications.

3.4.7 Relationship to the National Cadmium Management Strategy

One research institution noted that the NZTDS data also informs the National Cadmium Management Strategy, and this should be acknowledged. Further it noted that the implications of not undertaking dietary exposure assessment of all population groups should be evaluated.

We recognise the importance of the National Cadmium Management Strategy being informed by robust data such as the NZTDS. In response, we intend to provide contextual comparisons, both domestically and internationally, on cadmium levels of foods. We will also compare estimated doses for the infant and toddler population with previous NZTDS. The lack of up-to-date information on what New Zealanders eat, limits our ability to undertake a NZTDS that includes ages from five years and over at the current time.

3.4.8 Country of origin

Two industry submitters commented in relation to country of origin. One recommended differentiating between New Zealand born and raised pork and imported pork. One submitter suggested it would be helpful information was collected about the country of origin of the foods during sampling so that, in the event that unsafe levels of contaminants are found, differentiation can be made between imported foods and domestically-produced food. One individual submitter raised specific concerns regarding imported foods from China and would like to see country of origin on product packaging.

In response, we will collect information on country of origin from the product packaging and labelling where available. However, it is acknowledged that not all foods display this information and there is inconsistency in the declarations for country of origin. As such it is unlikely that this information will be reported on. This will also assist in any required decision making if an unexpected level of chemical is found.

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