

CODEX ALIMENTARIUS COMMISSION



Food and Agriculture
Organization of the
United Nations



World Health
Organization

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Agenda Item 5(e)

CRD24

Original language only

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD ADDITIVES

Fifty-third Session

GENERAL INFORMATION ON THE AVAILABILITY OF DATA RELATED TO NITRATES AND NITRITES

(REPLIES TO CL 2021/82-FA)

(Comments of China and Senegal)

China

1. Provisions of nitrates and nitrites in China

Sodium nitrate (INS 251) and potassium nitrate (INS 252), sodium nitrite (INS 250) and potassium nitrite (INS 249) are allowed to use as colors and preservatives in China "Standard for the Use of Food Additives" (GB2760). At the same time, "Standard for Maximum levels of contaminants in food" (GB2762) has the limits of nitrates and nitrites for preserved vegetables, raw milk, infant formula food and other food categories.

Table 1 Provisions of nitrates and nitrites in GB2762 and GB2760

Food Category	ML for nitrates (g/kg)	ML for nitrites (g/kg)	Limits for nitrates (g/kg, on NaNO ₃ basis)	Limits for nitrites (g/kg, on NaNO ₂ basis)
Cured meat product (brined meat, preserved pork, preserved duck, Chinese-style ham, Chinese sausage, etc.)	0.5 (As sodium (potassium) nitrite, residue ≤30mg/kg)	0.15 (As sodium nitrite, residue ≤30mg/kg)	/	/
Thick gravy cooked meat	0.5 (As sodium (potassium) nitrite, residue ≤30mg/kg)	0.15 (As sodium nitrite, residue ≤30mg/kg)	/	/
Smoked, baked or grilled meat products	0.5 (As sodium (potassium) nitrite, residue ≤30mg/kg)	0.15 (As sodium nitrite, residue ≤30mg/kg)	/	/
Fried meat	0.5 (As sodium (potassium) nitrite, residue ≤30mg/kg)	0.15 (As sodium nitrite, residue ≤30mg/kg)	/	/
Western hams (grilled, smoked and steam boiled)	0.5 (As sodium (potassium) nitrite, residue ≤30mg/kg)	0.15 (As sodium nitrite, residue ≤70mg/kg)	/	/
Sausage	0.5 (As sodium (potassium) nitrite, residue ≤30mg/kg)	0.15 (As sodium nitrite, residue ≤30mg/kg)	/	/
Fermented meat products	0.5 (As sodium (potassium) nitrite, residue ≤30mg/kg)	0.15 (As sodium nitrite, residue ≤30mg/kg)	/	/
Canned meat	/	0.15 (As sodium nitrite, residue ≤50mg/kg)	/	/
Pickled vegetables	/	/	/	20
Raw milk	/	/	/	0.4
Milk powder	/	/	/	2.0
Packaged drinking water (excluding mineral water)	/	/	/	0.005 mg/L (on NO ₂ basis)
Mineral water	/	/	45 mg/L (on NO ₃ basis)	0.1 mg/L (on NO ₂ basis)
Formula for infants, older infants and young children	/	/	100 (in powdered product basis)	2.0 (in powdered product basis)
Formulas for special medical purposes intended for infants	/	/	100 (in powdered product basis)	2.0 (in powdered product basis)
Cereal-based complementary foods for infants and young children	/	/	100	2.0

	Packaged drinking water	10378	4.36	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.73	0.73
	Domestic drinking water	67	55.22	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
	Fermented soy Sauce	21	4.76	0.05	1.00	0.00	0.22	0.00	1.00	0.00	1.00	1.00	1.00
	Sugar	381	24.93	0.21	0.56	0.50	0.50	0.00	0.30	1.10	1.10	3.80	3.80

The detection rates for nitrate in fresh vegetables, dairy products, and fermented sauces were 100%. The detection rates in meat products were the lowest, but they also reached 56.22%~68.42%. In terms of content level, leafy vegetables were as high as 936.13 mg/kg, and other vegetables were also higher than 100 mg/kg. Secondly, the average content of nitrate in meat products was also higher than 20 mg/kg. The content of other foods was relatively low.

Table3 Contents of nitrates in food

Food category	Samples	Detection rate (%)	Contents of nitrates (mg/kg) (On NO ₂ basis)										
			Mean		SD		Median		P95		Max		
			LB	UB	LB	UB	LB	UB	LB	UB	LB	UB	
Meat products	5585												
Canned meat	19	68.42	76.53	77.79	90.55	91.65	30.66	30.66	243.07	243.07	243.07	243.07	
Thick gravy cooked meat	3542	67.76	38.20	40.63	261.10	261.41	11.68	13.70	138.69	138.69	8686.13	8686.13	
Sausage	835	71.50	27.55	29.69	40.77	42.00	16.06	16.06	103.87	103.87	341.61	341.61	
Steam boiled meat products	162	66.05	22.71	25.57	28.82	30.64	11.72	13.93	78.83	78.83	167.88	167.88	
Smoked, baked or grilled Meat products	73	67.12	28.81	31.67	119.62	120.18	8.03	10.44	56.77	56.77	1021.90	1021.90	
Cured meat product	737	61.47	44.89	48.43	388.67	389.02	9.12	11.39	131.39	131.39	7445.26	7445.26	
Steam boiled meat products	217	56.22	20.89	23.89	39.28	40.64	5.40	10.00	75.04	75.04	222.63	222.63	
Vegetables	430												
Leafy vegetables	59	100.00	936.13	936.13	629.55	629.55	872.07	872.07	1983.85	1983.85	2238.50	2238.50	
Bulb vegetables	36	100.00	450.83	450.83	349.96	349.96	352.33	352.33	1087.95	1087.95	1145.15	1145.15	
Stem vegetables	59	100.00	379.77	379.77	619.65	619.65	67.15	67.15	1801.39	1801.39	2551.09	2551.09	
Brassica vegetables	75	100.00	254.82	254.82	293.40	293.40	135.22	135.22	937.17	937.17	1094.89	1094.89	
Melons vegetables	70	100.00	165.29	165.29	573.70	573.70	43.83	43.83	500.96	500.96	4734.31	4734.31	
Leguminous vegetables	72	100.00	152.07	152.07	147.69	147.69	100.82	100.82	401.39	401.39	483.94	483.94	
Solanaceous vegetable	59	100.00	142.47	142.47	175.81	175.81	47.51	47.51	456.18	456.18	770.80	770.80	
Milk and milk products	110												
Liquid milk	30	100.00	17.38	17.38	13.10	13.10	13.80	13.80	38.35	38.35	59.27	59.27	
Milk powder	80	100.00	4.70	4.70	5.46	5.46	3.51	3.51	11.68	11.68	31.31	31.31	
Drinking water	261												
Packaged drinking water	228	85.53	1.79	1.80	1.81	1.81	1.43	1.43	6.08	6.08	7.45	7.45	
Domestic drinking water	33	78.79	2.09	2.13	2.11	2.15	0.73	0.73	5.66	5.66	5.68	5.68	
Fermented soy Sauce	20	100.00	22.80	22.80	18.16	18.16	15.33	15.33	50.87	50.87	75.77	75.77	
Total	6406												

3. Dietary exposure risk assessment of nitrites in Chinese urban population

Based on the results of the probability assessment, the average value of nitrite exposure was 1.11 µg/kg BW. The maximum value of nitrite exposure was 259.94 µg/kg BW, about 9 times of nitrite ADI. The proportion of people who exceeded the ADI was 0.04%. The average and median values of nitrite exposure for men and women were basically the same, with no significant difference. The average exposure of nitrite in each age-sex group was 0.80~3.23 µg/kg BW. There was a significant difference between groups. The average value of nitrite exposure and the proportion of people exceeding ADI for minors were 2.04 µg/kg BW and 0.21%, which were higher than those of adults. The highest proportion of people who exceeded ADI were women aged 7-12 years, accounting for 0.87%.

Table 4 Probabilistic assessment of dietary nitrite exposure of the whole population in China ($\mu\text{g}/\text{kg BW}$)

Group	N	Mean	P50	P95	Max	Proportion of people exceeding ADI (%)	P
male	4904	1.10	0.47	3.43	259.94	0.02	0.36
female	5096	1.12	0.47	3.64	132.15	0.06	
3-6 y	675	2.37	0.87	6.91	259.94	0.15	0.00
7-12 y male	460	1.55	0.74	5.32	14.47	0.00	
7-12 y female	345	3.23	0.73	9.77	132.15	0.87	
13-17 y male	200	1.09	0.62	3.60	9.88	0.00	
13-17 y female	192	0.94	0.42	3.13	7.96	0.00	
18-59 y male	3164	0.90	0.42	3.02	30.66	0.00	
18-59 y female	3571	0.92	0.47	3.12	44.54	0.00	
Above 60 y male	720	0.81	0.43	2.43	18.91	0.00	
Above 60 y female	673	0.80	0.40	3.11	13.57	0.00	
Under 18y	1872	2.04	0.71	6.11	259.94	0.21	
Above 18y	8128	0.89	0.44	3.08	44.54	0.00	
Total population	10000	1.11	0.47	3.52	259.94	0.04	

Table 5 showed the contribution rate of various foods to the nitrite intake of people of different age and sex groups. The food with the highest contribution rate to nitrite dietary intake of the general population was meat products. The second was fresh vegetables, with a contribution rate of 19.73%. The contribution rate of other foods was below 10%. From the perspective of age and sex groups, the food with the highest contribution rate of nitrite in adults was meat products, followed by fresh vegetables and aquatic products. In theory, nitrite as a food additive only exists in meat products. Therefore, nitrite in meat products is considered as a food additive in this study. It can be seen that nitrite used as a food additive accounted for 62.22% of the total exposure of nitrite, which was the main source of exposure of nitrite.

Table 5 Contribution rate of different foods to nitrite exposure (%)

Groups	Meat products	Fresh Vegetables	Aquatic products	Pickle vegetables	Brewing sauce	Domestic drinking water	Milk products	Sugar	Packaged drinking water
3-6 y	70.61	13.89	5.42	0.99	1.21	1.30	4.44	1.28	0.86
7-12 y	75.95	12.20	5.13	1.43	1.26	0.90	1.49	1.00	0.65
13-17 y	58.26	20.46	10.80	2.23	2.48	1.61	1.34	1.59	1.23
18-59 y	57.86	22.04	10.14	2.71	1.97	1.68	0.69	1.57	1.33
Above 60 y	53.05	27.49	7.78	3.14	1.73	2.18	1.95	1.71	0.96

Groups	Meat products	Fresh Vegetables	Aquatic products	Pickle vegetables	Brewing sauce	Domestic drinking water	Milk products	Sugar	Packaged drinking water
Male	62.77	19.12	8.23	2.23	1.81	1.52	1.75	1.46	1.13
Female	61.71	20.31	8.59	2.32	1.67	1.58	1.30	1.44	1.09
Northern	60.43	20.95	7.09	2.95	2.08	2.09	1.44	1.62	1.36
Southern	62.88	19.28	8.90	2.03	1.61	1.35	1.55	1.39	1.02
Minor	71.87	13.77	5.84	1.33	1.37	1.14	2.71	1.18	0.80
Adult	57.11	22.88	9.78	2.78	1.93	1.76	0.89	1.59	1.27
Whole population	62.22	19.73	8.42	2.28	1.74	1.55	1.52	1.45	1.11

The nitrate exposure of the urban population in China presented a positively skewed distribution, with the vast majority of individuals exposed to less than 14 mg/kg BW. The average value of nitrate exposure was 2.15 mg/kg BW, and P95 was 7.17 mg/kg BW, which exceeded the ADI of nitrate. The maximum exposure of nitrate (73.99 mg/kg BW) was about 20 times that of ADI, and the proportion of people exceeding ADI is 17.04%. There was a certain difference in nitrate exposure between men and women, with women slightly higher than men. The average nitrate exposure in each age-gender group was 1.88 to 2.96 mg/kg BW, with significant differences between the groups. The average nitrate exposure of minors was 2.58 mg/kg BW, and the proportion of people exceeding ADI was 23.13%, which was higher than that of adults. The highest proportion of children aged 3-6 years who exceed ADI was 28.15%.

Table 6 Probability Assessment of Dietary Nitrate Exposure in China (mg/kg BW)

Group	N	Mean	95%CI	Median	P95	Max	Proportion of people exceeding ADI (%)	P
Male	4904	2.07	1.99~2.15	1.20	6.78	31.81	16.15	0.02
Female	5096	2.23	2.14~2.31	1.29	7.64	73.99	17.90	
3-6 y	675	2.96	2.69~3.22	1.64	9.49	31.81	28.15	0.00
7-12 y Male	460	2.52	2.20~2.81	1.42	9.18	24.32	20.87	
7-12 y Female	345	2.53	2.24~2.87	1.37	9.10	17.92	25.51	
13-17 y Male	200	2.16	1.70~2.61	1.11	6.68	25.47	18.50	
13-17 y Female	192	1.96	1.45~2.46	1.31	4.93	58.68	11.46	
18-59 y Male	3164	1.88	1.79~1.97	1.15	6.02	31.10	13.37	
18-59 y Female	3571	2.11	2.02~2.19	1.27	7.13	26.55	16.77	
Above 60 y Male	720	2.18	1.97~2.41	1.19	6.74	26.63	18.89	
Above 60 y Female	673	2.37	2.01~2.74	1.20	7.33	73.99	16.79	
Minor	1872	2.58	2.42~2.72	1.41	9.01	58.68	23.13	0.00

Group	N	Mean	95%CI	Median	P95	Max	Proportion of people exceeding ADI (%)	P
Adult	8128	2.05	1.98~2.11	1.21	6.71	73.99	15.64	
Total population	10000	2.15	2.09~2.21	1.24	7.17	73.99	17.04	

The contribution rate of various foods to nitrate intake in different age and gender groups was shown in Table 7. The food with the highest contribution rate to nitrate dietary intake in the general population was leafy vegetables (78.08%); The second was fresh vegetables such as bulbs, rhizomes, melons, and fruits, and the third was domestic drinking water, with a contribution rate of 1.43%; The contribution rate of other foods was less than 1%. In theory, nitrate, as a food additive, only exists in meat products. Therefore, in this study, nitrate in meat products was considered a food additive. It can be seen that nitrate used as a food additive accounted for only 0.56% of the total exposure to nitrate, which was not the main source of exposure to nitrate.

Table 7 Contribution rate of various foods to nitrate exposure (%)

Group	Leafy vegetables	Bulbs	Rhizomes	Melons and fruits	Brassica	Solanaceae	Fresh beans	Domestic drinking water	Packaged drinking water	Meat products	Liquid milk	Milk powder	Brewing sauce
3-6 y	75.01	5.29	5.35	2.98	2.39	3.01	1.97	1.90	0.70	0.49	0.56	0.33	0.04
6-12 y	76.13	3.72	4.66	5.31	2.79	2.59	1.64	1.48	0.57	0.57	0.37	0.15	0.03
13-17 y	80.16	4.81	3.39	2.14	1.81	2.61	2.01	1.41	0.66	0.61	0.24	0.12	0.04
18-59 y	78.60	4.98	3.87	3.37	2.43	2.33	1.66	1.37	0.62	0.62	0.09	0.03	0.03
Above 60 y	78.53	4.68	4.47	4.31	2.29	2.10	1.35	1.35	0.37	0.37	0.07	0.08	0.02
Male	78.46	4.59	4.18	3.54	2.47	2.30	1.59	1.41	0.62	0.58	0.15	0.09	0.03
Female	77.74	5.06	4.14	3.68	2.36	2.48	1.71	1.45	0.55	0.55	0.18	0.08	0.03
Northern	65.21	9.67	5.29	3.98	3.81	4.61	3.15	2.18	0.86	0.88	0.26	0.07	0.04
Southern	81.96	3.39	3.81	3.50	1.99	1.73	1.20	1.20	0.50	0.47	0.13	0.09	0.03
Minor	76.34	4.55	4.73	3.82	2.46	2.76	1.84	1.64	0.64	0.54	0.43	0.22	0.03
Adult	78.59	4.92	3.99	3.55	2.40	2.29	1.60	1.37	0.57	0.57	0.09	0.04	0.03
Total population	78.08	4.84	4.16	3.61	2.41	2.39	1.65	1.43	0.58	0.56	0.16	0.08	0.03

In summary, the risk of dietary exposure to nitrite in urban populations in China is relatively low, with only a few high-consumption individuals having exposure levels exceeding ADI, which was mainly contributed by meat products. The nitrate exposure P95 of the entire population has exceeded ADI, with the average nitrate exposure of minors reaching 70% of ADI and 23% of the population exceeding ADI, which was mainly contributed by vegetables, posing a certain health risk.

Senegal

Contexte : Le CCFA, à sa cinquante-deuxième session a examiné les observations en réponse à la CL 2019/49-FA (c'est-à-dire CX/FA 21/52/10) et a convenu de demander au Secrétariat du Codex de distribuer une lettre circulaire (la même que la CL 2019/49-FA) afin de recueillir des informations générales sur les données relatives aux nitrates et aux nitrites.

Position : Le Sénégal remercie et félicite les membres et observateurs du Codex qui ont fourni des données en réponse à la lettre circulaire «CL 2021/82-FA». Cependant, les informations fournies ne semblent pas être suffisantes pour permettre un avis scientifique.

Le Sénégal réfléchit sur les modalités pratiques permettant de fournir des données conformes aux dispositions du JECFA.

Justification : Les données soumises sont limitées dans leur couverture géographique et à un nombre restreint de catégories d'aliments.