

# Evaluating changes in agri-food demand in Papua New Guinea over time: learning about the BACI trade dataset

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Evidence-based trade policymaking and analysis

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## Some questions to get us thinking...

- What does PNG export overall?
  - What are PNG's most important agri-food exports?
- What are some of the most important agri-food imports?
- Can we look at imports and begin to have an idea of how demand for food has changed over time?
- What type of food items should we evaluate?



# Let's explore!

- Let's start with the most aggregated data, just to get a BIG picture → open the *BACI\_PNG\_hs2.xlsx* file
- To look at ALL export data, click on the e\_all tab
- I am going to **average the last few years** in order to smooth some of the odd numbers that may be in the data
- The largest export (in terms of value) is mineral fuels. Next is natural and cultured pearls / semi-precious stones
- However, I would like to just look at agri-food export

The screenshot shows an Excel spreadsheet titled "BACI\_PNG\_hs2.xlsx" with a green header bar. The spreadsheet displays export data for various HS codes from 2012 to 2018, with an average column for 2014-2018. The columns are labeled A through Z, with Z representing the average. The rows are labeled 1 through 26. The data is as follows:

HS_Description_2dgt	hs96_2dgt	v2012	v2013	v2014	v2015	v2016	v2017	v2018	AVERAGE: 2014 - 2018
Mineral fuels, mineral oils and products of their distillation; bituminous substances	27	1,379,042	1,044,580	3,961,198	4,243,200	3,309,770	4,216,441	2,928,997	3,731,921
Natural, cultured pearls; precious, semi-precious stones; precious metals or their waste	71	3,906,621	2,269,793	2,042,121	1,986,317	2,209,984	2,153,507	2,245,717	2,127,529
Wood and articles of wood; wood charcoal	44	343,293	713,901	921,842	750,158	712,388	648,599	858,304	778,258
Ores, slag and ash	26	1,423,325	1,077,795	795,167	368,657	454,958	843,553	476,254	587,718
Animal or vegetable fats and oils and their cleavage products; preparations thereof	15	695,437	520,337	539,853	465,123	441,231	593,753	523,096	512,611
Nickel and articles thereof	75	3,224	154,739	313,842	220,079	200,782	366,902	517,007	323,722
Fish and crustaceans, molluscs and other aquatic invertebrates	03	213,761	101,287	109,475	187,842	255,497	317,747	288,329	231,778
Coffee, tea, mate and spices	09	297,157	152,370	189,251	156,222	201,626	199,219	200,512	189,366
Meat, fish or crustaceans, molluscs or other aquatic invertebrates; preparations thereof	16	149,893	170,734	138,426	118,859	119,701	190,516	218,829	157,266
Cocoa and cocoa preparations	18	129,163	122,076	125,247	132,327	150,121	79,555	80,009	113,452
Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit	12	42,822	23,511	34,812	37,174	54,481	55,894	49,157	46,304
Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	84	64,504	30,645	38,185	17,950	12,262	12,132	20,485	20,203
Food industries, residues and wastes thereof; prepared animal foodstuffs	23	13,466	8,472	8,947	9,486	8,519	13,707	10,382	10,208
Raw hides and skins (other than furskins) and leather	41	6,528	8,642	11,020	14,189	9,381	7,149	5,388	9,426
Rubber and articles thereof	40	28,155	15,280	9,368	6,132	7,840	6,616	9,276	7,847
Aluminium and articles thereof	76	4,708	4,918	6,369	8,218	6,148	7,074	8,683	7,298
Aircraft, spacecraft and parts thereof	88	11,568	1,214	6,906	1,643	12,403	3,694	11,467	7,223
Electrical machinery and equipment and parts thereof; sound recording apparatus	85	5,834	7,707	11,208	7,735	3,749	2,369	10,239	7,060
Optical, photographic, cinematographic, measuring, checking, medical, surgical, electrical, electronic, computing or other office machines	90	4,963	4,126	12,164	1,763	4,309	4,172	12,009	6,883
Iron and steel	72	100,514	13,493	15,103	4,409	2,254	5,250	5,524	6,508
Organic chemicals	29	175,714	164	173	62	35	20,677	9,615	6,112
Copper and articles thereof	74	3,894	5,986	5,503	4,324	3,152	3,946	5,506	4,486
Beverages, spirits and vinegar	22	3,204	4,838	3,884	1,600	2,940	2,342	2,910	2,735
Vehicles; other than railway or tramway rolling stock, and parts and accessories thereof	87	15,008	9,257	7,548	1,763	1,787	1,069	1,218	2,677
Works of art; collectors' pieces and antiques	97	1,173	1,190	1,431	1,013	1,766	4,390	3,600	2,440

# Looks like Animal or vegetable fats and oils etc. is a major agri-food export for PNG...but I am not sure what this is → we need to look at more disaggregated data

- Animal or vegetable fats and oil is HS 2-digit code 15.
- Let's check all of the 4-digit code that begin with 15
- Question:** What does the 6-digit code tell us about this food item? → You can go and figure it out looking at the BACI\_PNG\_hs6.xlsx in your data folder

BACI\_PNG\_hs2.xlsx - Excel

HS_Description_2dgt	hs96_2dgt	v2012	v2013	v2014	v2015	v2016	v2017	v2018	AVERAGE: 2014-2018
Animal or vegetable fats and oils and their cleavage products; prepared animal or vegetable fats and oils and their cleavage products	15	695,437	520,337	539,853	465,123	441,231	593,753	523,096	512,611
Fish and crustaceans, molluscs and other aquatic invertebrates	03	213,761	101,287	109,475	187,842	255,497	317,747	288,329	231,778
Coffee, tea, mate and spices	09	297,157	152,370	189,251	156,222	201,626	199,219	200,512	189,366
Meat, fish or crustaceans, molluscs or other aquatic invertebrates; preparations	16	149,893	170,734	138,426	118,859	119,701	190,516	218,829	157,266
Cocoa and cocoa preparations	18	129,163	122,076	125,247	132,327	150,121	79,555	80,009	113,452
Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit, industrial or medicinal	12	42,822	23,511	34,812	37,174	54,481	55,894	49,157	46,304
Food industries, residues and wastes thereof; prepared animal fodder	23	13,466	8,472	8,947	9,486	8,519	13,707	10,382	10,208
Raw hides and skins (other than furskins) and leather	41	6,528	8,642	11,020	14,159	9,346	7,149	5,388	9,412
Rubber and articles thereof	40	24,430	14,494	8,293	5,486	7,145	6,151	8,919	7,199
Beverages, spirits and vinegar	22	2,238	2,590	2,113	1,503	1,612	1,077	1,417	1,544
Preparations of cereals, flour, starch or milk; pastrycooks' products	19	2,024	991	1,019	1,113	1,428	1,572	2,048	1,436
Tobacco and manufactured tobacco substitutes	24	181	2			721	991	2,005	1,239
Miscellaneous edible preparations	21	551	437	248	343	1,442	61	34	426
Cereals	10	50	3	162		634		386	394
Products of the milling industry; malt, starches, inulin, wheat gluten	11	989	237	434	21	232	426	299	283
Animal originated products; not elsewhere specified or included	05	608	399	178	86	323	357	344	257
Meat and edible meat offal	02	459	134	337	45	44	46	254	145
Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	04	70	119			42	158		100
Trees and other plants, live; bulbs, roots and the like; cut flowers and ornamental foliage	06	121	86	74	170	98	53	38	86
Fruit and nuts, edible; peel of citrus fruit or melons	08	3,378	21	290		12	9	2	78
Leguminous products and other vegetable products, not elsewhere specified or included	13	59	29	166	119	2	9	42	68

gFoodList | ReadMe | e\_all | **e\_ag** | m\_all | m\_ag | e\_ag\_partners | m\_ag\_partners

# Animal or vegetable fats and oils is composed of lots of different types of agri-food

- When you sum all of the items that are in the 15 HS code category, you will sum to the 2-digit export value
- Palm oil is a very important export for PNG**
- Coconut (copra) oil is the 2<sup>nd</sup> largest item in this category
- Question:** Where is PNG exporting its Palm oil??

AutoSave Off | BACI\_PNG\_hs4.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Help Search

BC133

	C	D	T	U	V	W	X	Y	Z	AA	AY	AZ
1	HS_Description_4dgt	hs96_4dgt	v2012	v2013	v2014	v2015	v2016	v2017	v2018	Average 2014-2018		
117	Vegetable materials of a kind used primarily in bro	1403										
118	Vegetable products not elsewhere specified or incl	1404	609			7			1		4	
119	Pig fat (including lard) and poultry fat, other than th	1501										
120	Fats of bovine animals, sheep or goats; other than t	1502	99									
121	Lard stearin, lard oil, oleostearin, oleo-oil and tallo	1503	15									
122	Fats and oils and their fractions of fish or marine m	1504						160		160		
123	Wool grease and fatty substances derived therefro	1505										
124	Animal fats and oils and their fractions; whether or	1506	99									
125	Soya-bean oil and its fractions; whether or not refir	1507						10		10		
126	Ground nut oil and its fractions; whether or not refi	1508	3									
127	Olive oil and its fractions; whether or not refined, b	1509										
128	Oils and their fractions n.e.s. in chapter 15, obtaine	1510										
129	Palm oil and its fractions; whether or not refined, b	1511	604,577	460,442	459,101	384,655	348,531	463,555	430,498	417,268		
130	Sun-flower seed, safflower or cotton-seed oil and t	1512										
131	Coconut (copra), palm kernel or babassu oil and the	1513	90,497	59,874	80,726	80,403	92,689	130,008	92,534	95,272		
132	Rape, colza or mustard oil and their fractions; whet	1514	83									
133	Fixed vegetable fats and oils (including jojoba oil) e	1515	1	2								
134	Animal or vegetable fats and oils and their fraction:	1516			2	14	12	21	19	14		
135	Margarine; edible mixtures or preparations of anim	1517	10			31			45	38		
136	Animal or vegetable fats, oils, fractions, modified i	1518			17	8				13		
137	Vegetable waxes (other than triglycerides), beesw	1521										
138	Degras; residues resulting from the treatment of fa	1522	51	20	5	10				8		
139	Sausages and similar products of meat, meat offal c	1601										
140	Prepared or preserved meat, meat offal or blood	1602	4,277	1,379	1,473	1,597	1,606	1,278	1,320	1,455		
141	Extracts and juices of meat, fish or crustaceans, mo	1603	370	322	335	423	414	357	434	393		
142	Prepared or preserved fish; caviar and caviar substi	1604	145,235	169,034	136,618	116,839	117,681	178,756	199,580	149,895		
143	Crustaceans, molluscs and other aquatic invertebra	1605	12					10,124	17,495	13,810		
144	Cane or beet sugar and chemically pure sucrose, in	1701	19	34	31	33	64	39	57	45		
145	Sugars, including lactose, maltose, glucose or fructo	1702	1									
146	Molasses; resulting from the extraction or refining	1703							12	12		
147	Sugar confectionery (including white chocolate), nc	1704	8	10								

AgFoodList | ReadMe | e\_all | e\_ag | m\_all | m\_ag | e\_ag\_partners | m\_ag\_partners

# Looks like the majority of palm oil exports is going to Europe

- Go to the tab *e\_ag\_partners* in the HS 4 digit spreadsheet – this gives you information on the exports by importing country.

A note on using the 'Sort' function in excel:

- Highlight the entire spreadsheet by clicking on the triangle in the upper left-hand corner
- Go to the 'Data' tab
- Click 'Sort'
- You may have to sort with two levels to get the information you are looking for

The screenshot shows the Excel interface with the 'Data' tab selected. The 'Sort' dialog box is open, showing the following settings:

- Column: hs96\_4dgt
- Sort On: Cell Values
- Order: Smallest to Largest
- Then by: v2018
- Sort On: Cell Values
- Order: Largest to Smallest

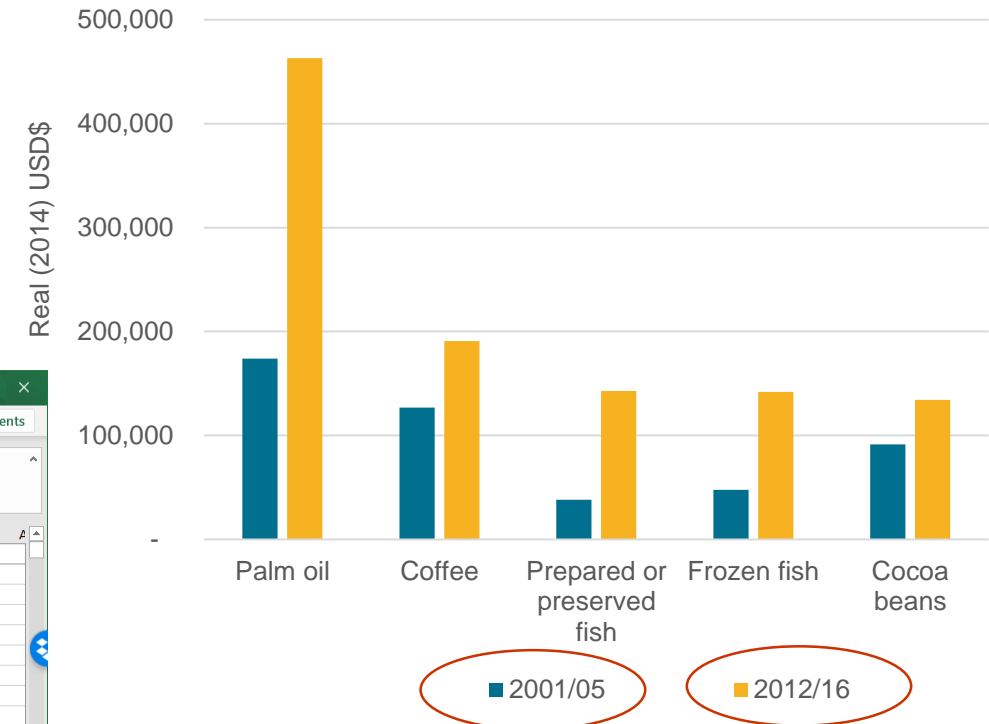
The spreadsheet data is as follows:

	A	B	C	D	S	T	U	V	v2016	v2017	v2018
1	m_abv	importer	HS_Description_4dgt	hs96_4dgt	v2012	v2013	v2014	v2015	v2016	v2017	v2018
17897	TWN	Taiwan, Province of (Chin	Oils and their fractions n.e	1510							
17898	UKR	Ukraine	Oils and their fractions n.e	1510							
17899	URY	Uruguay	Oils and their fractions n.e	1510							
17900	USA	United States of America	Oils and their fractions n.e	1510							
17901	VEN	Venezuela	Oils and their fractions n.e	1510							
17902	VNM	Viet Nam	Oils and their fractions n.e	1510							
17903	VUT	Vanuatu	Oils and their fractions n.e	1510							
17904	WLF	Wallis and Futuna	Oils and their fractions n.e	1510							
17905	WSM	Samoa	Oils and their fractions n.e	1510							
17906	YEM	Yemen	Oils and their fractions n.e	1510							
17907	YUG	Yugoslavia	Oils and their fractions n.e	1510							
17908	ZAF	South Africa	Oils and their fractions n.e	1510							
17909	NLD	Netherlands	Palm oil and its fractions; v	1511	136,067	68,179	73,504	41,890	123,483	223,219	258,074
17910	GBR	United Kingdom	Palm oil and its fractions; v	1511	158,493	141,540	152,125	122,272	103,312	107,289	81,710
17911	ESP	Spain	Palm oil and its fractions; v	1511	87,569	70,987	45,681	48,310	33,940	42,485	39,354
17912	IND	India	Palm oil and its fractions; v	1511					2,316	13,158	16,683
17913	BEL	Belgium-Luxembourg	Palm oil and its fractions; v	1511	31,262	19,758	18,680	15,025	13,051	17,773	16,310
17914	MYS	Malaysia	Palm oil and its fractions; v	1511	20,206	16,356	14,515	16,397	7,627	15,505	14,775
17915	CHE	Switzerland-Liechtenstei	Palm oil and its fractions; v	1511	584	752		1,512	2,593	3,620	3,513
17916	CZE	Czech Republic	Palm oil and its fractions; v	1511							77
17917	DEU	Germany	Palm oil and its fractions; v	1511	152,851	121,617	132,847	117,842	59,510	40,364	3
17918	AIA	Anguilla	Palm oil and its fractions; v	1511							
17919	AND	Andorra	Palm oil and its fractions; v	1511							
17920	ANT	Netherland Antilles and A	Palm oil and its fractions; v	1511							
17921	ARE	United Arab Emirates	Palm oil and its fractions; v	1511							
17922	ARG	Argentina	Palm oil and its fractions; v	1511							
17923	ARM	Armenia	Palm oil and its fractions; v	1511							

# What are the most important exports in terms of overall value, and how have they changed over time?

- Use the 4-digit (and 6-digit when necessary) HS codes to identify the most important exports → and average from 2012-2016
- Why average??? → as we have seen, there will be noise in the data, so we want to smooth some of the individual values.
- Do the same for 2001/05 (Caveat – we are showing real values. However, you can also look at differences in the share of total agri-food export in nominal / current terms)

Value of largest agri-food exports in 2012-2016 (Real 2014 USD)



BACI.PNG\_hs4.xlsx - Excel

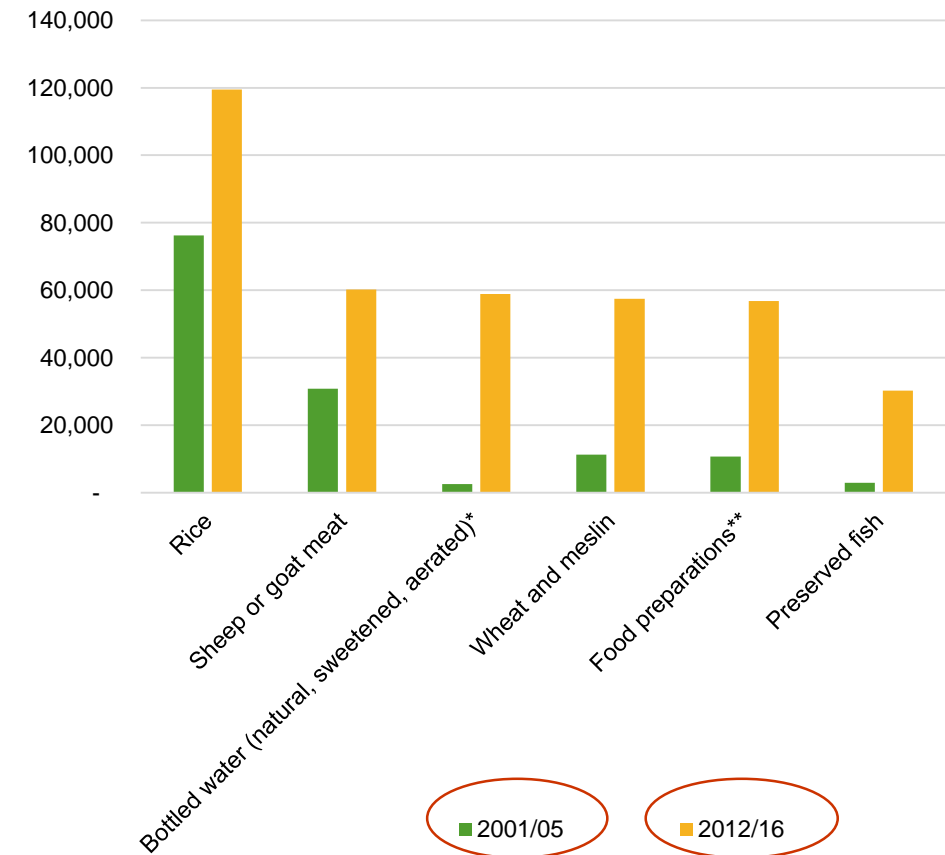
HS Description_4dgt	hs96_4dgt	v2001	v2002	v2003	v2004	v2005	AVERAGE 2001 - 2005	v2012	v2013	v2014	v2015	v2016	AVERAGE 2012 - 2016
1 Palm oil and its fractions; whether or not refined, b	1511	84,752	136,710	177,913	171,030	151,762	144,433	604,577	460,442	459,101	384,655	348,531	451,461
3 Coffee, whether or not roasted or decaffeinated; h	0901	81,221	111,433	105,553	96,266	141,178	107,130	280,660	145,063	181,949	146,987	183,552	187,642
4 Fish; frozen (excluding fish fillets and other fish me	0303	34,575	35,054	53,649	30,588	31,186	37,011	135,669	86,458	93,848	172,149	240,135	145,652
5 Prepared or preserved fish; caviar and caviar substi	1604	12,684	22,128	27,610	34,420	49,235	29,216	145,235	169,034	136,618	116,839	117,681	137,081
6 Coconut (copra), palm kernel or babassu oil and the	1801	49,680	65,969	74,058	73,905	93,248	71,372	129,006	122,026	125,175	131,631	150,084	131,584
7 Copra	1513	16,731	30,272	51,411	49,571	52,189	40,035	90,497	59,874	80,726	80,403	92,689	80,838
8 Fish; fresh or chilled (excluding fish fillets and othe	0302	10,783	16,207	16,664	18,964	6,744	13,872	53,688	3,965	5,388	3,638	1,078	13,551
10 Natural rubber, balata, gutta-percha, guayule, chicl	4001	2,621	2,947	6,205	5,785	6,696	4,851	24,430	14,494	8,293	5,486	7,145	11,970
11 Crustaceans, in shell or not, live, fresh, chilled, froz	0306	11,197	11,213	10,491	8,978	8,344	10,045	9,158	7,501	7,981	9,689	10,412	8,948
12 Raw hides and skins n.e.s in headings no. 4101, 410:	4103	2,898	2,048	2,037	3,539	3,482	2,801	4,724	6,511	7,048	11,603	6,965	7,370
13 Vanilla	0905	1,459	5,654	37,763	35,757	5,204	17,167	2,080	1,373	2,787	5,914	16,234	5,678
14 Tea	0902	7,071	10,364	12,463	28,395	7,424	13,143	13,269	5,284	4,269	3,226	1,742	5,558
15 Oil seeds and oleaginous fruits, others n.e.s. in cha	1207	1,297	8,458	3,192	3,805	4,106	4,172	20,214	2,456	666	514	1,420	5,054
16 Oil-cake and other solid residues; whether or not g	2306	1,689	2,253	4,682	4,730	4,305	3,532	8,259	3,697	4,350	3,682	3,403	4,678

# This analysis is particularly interested in how agri-food demand (imports) have changed over time

- What are the major things that are being imported?

- Use the 4-digit HS codes to identify the most important imports → and average from 2012-2016
- Rice is the largest agri-food import for PNG: both in 2001-05 and 2012-2016
  - Question: What is the average share of rice in total agri-food imports in 2012/16?
  - Where does PNG import most of its rice from?
  - Who are other potential rice exporters that are trading on the market?

Value of largest agri-food imports in 2012-2016 (Real 2014 USD)



Excel spreadsheet showing import data for PNG. The file name is 'BACI\_PNG\_hs4.xlsx'. The spreadsheet displays HS codes, descriptions, and values for various years (2001-2016) and averages for 2001-05 and 2012-16. The 'm\_ag' tab is selected.

HS_Description_4dgt	hs96_4dgt	v2001	v2002	v2003	v2004	v2005	AVERAGE 2001-05	v2012	v2013	v2014	v2015	v2016	AVERAGE 2012-16	AY
1 Rice	1006	3,149	49,143	72,598	72,346	60,364	51,520	201,427	36,664	55,463	155,971	147,531	119,411	
2 Meat of sheep or goats; fresh, chilled or frozen	0204	20,456	18,593	22,252	26,728	30,653	23,736	70,960	68,884	58,998	50,292	52,922	60,411	
3 Wheat and meslin	1001	1,557	4,797	5,128	8,187	7,681	5,470	61,955	50,893	62,795	53,879	70,526	60,010	
4 Waters, including mineral and aerated waters, containing	2202	747	1,879	1,381	2,468	3,449	1,985	33,548	57,267	61,877	62,178	77,540	58,482	
5 Food preparations not elsewhere specified or included	2106	5,868	5,663	8,014	9,440	4,073	6,611	36,341	39,860	73,377	72,423	67,029	57,806	
6 Prepared or preserved fish; caviar and caviar substitute	1604	381	1,520	1,994	5,087	3,195	2,435	28,867	27,373	33,771	30,763	31,174	30,390	
7 Palm oil and its fractions; whether or not refined, but	1511	3,443	4,647	5,558	1,897	1,564	3,422	28,613	17,112	27,451	28,049	22,201	24,685	
8 Meat and edible offal of poultry; of the poultry of the	0207	19	48	400	1,356	784	521	17,314	23,288	23,515	19,464	21,265	20,969	
9 Prepared or preserved meat, meat offal or blood	1602	2,007	3,355	3,230	3,916	3,611	3,224	17,913	21,837	18,008	16,307	12,703	17,353	
10 Edible offal of bovine animals, swine, sheep, goats, h	0206	3,295	1,736	1,600	2,132	2,937	2,340	14,929	13,546	12,726	12,376	13,838	13,483	
11 Sugar confectionery (including white chocolate), not	1704	1,399	1,634	2,434	3,182	3,308	2,392	10,274	9,778	12,683	11,037	13,680	11,491	
12 Pepper of the genus piper; dried or crushed or groun	0904	9	38	30	34	22	27	197	58	30	41	27,897	5,645	
13 Pasta; whether or not cooked or stuffed with meat or	1902	314	440	710	905	1,280	27	26,395	30,672	21,600	16,168	12,574		
14 Preparations of a kind used in animal feeding	2309	4,162	3,145	5,505	7,481	9,479	23,318	30,793	22,557	16,710	12,374			
15 Meat of bovine animals; frozen	0202	5,621	7,474	6,388	6,681	5,925	27,538	18,032	16,118	14,725	12,065			

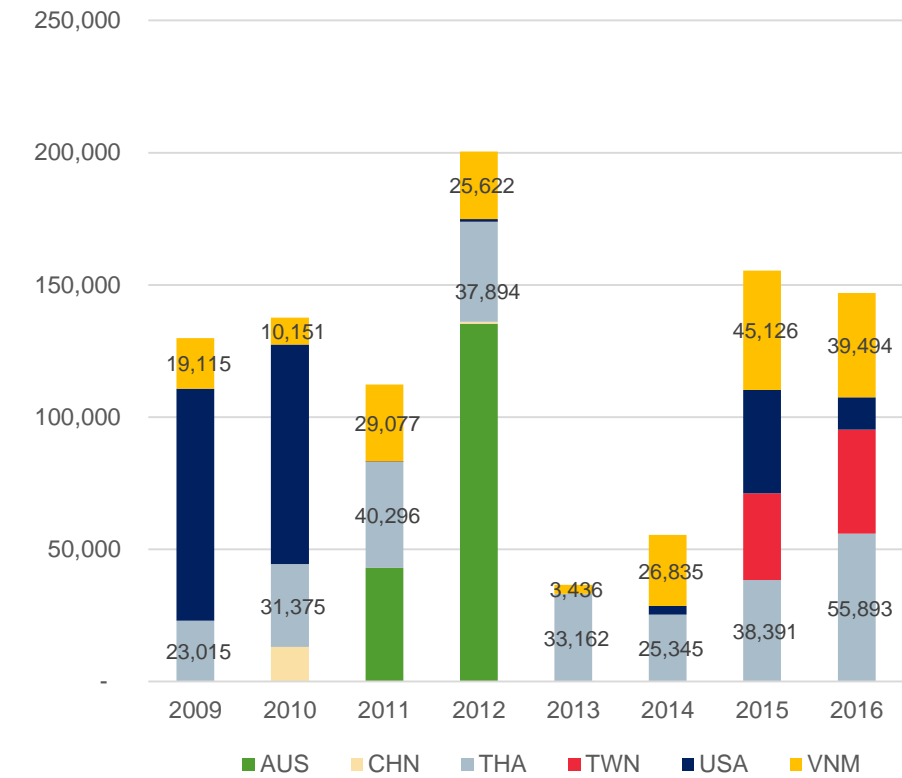


# Where does PNG import most of its rice from?

- Thailand and Vietnam are PNG's most important trading partners for rice
  - Question: What is the cost per metric ton of rice from PNG's most important trading partners?
  - Why do you think there are differences in cost?
- A note on sorting data: see below that I have sorted the database so I can look at specifically rice, and then look at the largest exporting partners by value. You will need to sort your data in different ways to explore different questions.

1	e_abv	exporter	HS_Descri	hs96_4dgt	v2012	v2013	v2014	v2015	v2016
9303	UKR	Ukraine	Maize (co	1005					
9304	USA	United St	Maize (co	1005					
9305	VEN	Venezuel	Maize (co	1005					
9306	VNM	Viet Nam	Maize (co	1005					
9307	VUT	Vanuatu	Maize (co	1005					
9308	WSM	Samoa	Maize (co	1005					
9309	ZAF	South Afri	Maize (co	1005					
9310	ZMB	Zambia	Maize (co	1005					
9311	THA	Thailand	Rice	1006	36,571	33,162	25,345	38,958	56,230
9312	VNM	Viet Nam	Rice	1006	23,327	3,436	26,835	45,126	39,494
9313	TWN	Taiwan, P	Rice	1006	3			32,755	39,311
9314	USA	United St	Rice	1006	947		3,213	39,080	12,216
9315	MMR	Myanmar	Rice	1006				22	267
9316	AUS	Australia	Rice	1006	137,447			3	6
9317	FJI	Fiji	Rice	1006				2	4
9318	IND	India	Rice	1006		14	48	30	2
9319	ZAF	South Afri	Rice	1006	14				1
9320	AIA	Anguilla	Rice	1006					
9321	ANT	Netherlan	Rice	1006					
9322	ARE	United Ar	Rice	1006					
9323	ARG	Argentina	Rice	1006					
9324	ASM	American	Rice	1006					
9325	ATG	Antigua	Rice	1006					

Nominal import values of all rice by exporting country (US '000)



# Wait a minute!! Something has caught my attention...

- “Bottled water (natural, sweetened, aerated)” and “food preparations” are the 3<sup>rd</sup> and 5<sup>th</sup> largest import.
- **Question:** What do these items consist of? → lets first check in the 6-digit HS codes

HS_Description_6dgt	hs96_6dgt	hs96_4dgt	v1998	v1999
Ice cream and other edible ice; whether or not containing cocoa	210500	2105	860	679
Protein; concentrates and textured protein substances	210610	2106	113	56
Food preparations; n.e.s. in item no. 2106.10	210690	2106	7,598	4,571
Waters; mineral and aerated, including natural or artificial, (not containing added sugar or other sweetening matter or flavoured)	220110	2201	13	68
Waters; other than mineral and aerated, (not containing added sugar or other sweetening matter nor flavoured)	220190	2201		17
Waters; including mineral and aerated, containing added sugar or other sweetening matter or flavoured	220210	2202	485	547
Non-alcoholic beverages; n.e.s. in item no. 2202.10, not including fruit or vegetable juices of heading no. 2009	220290	2202	1,037	803

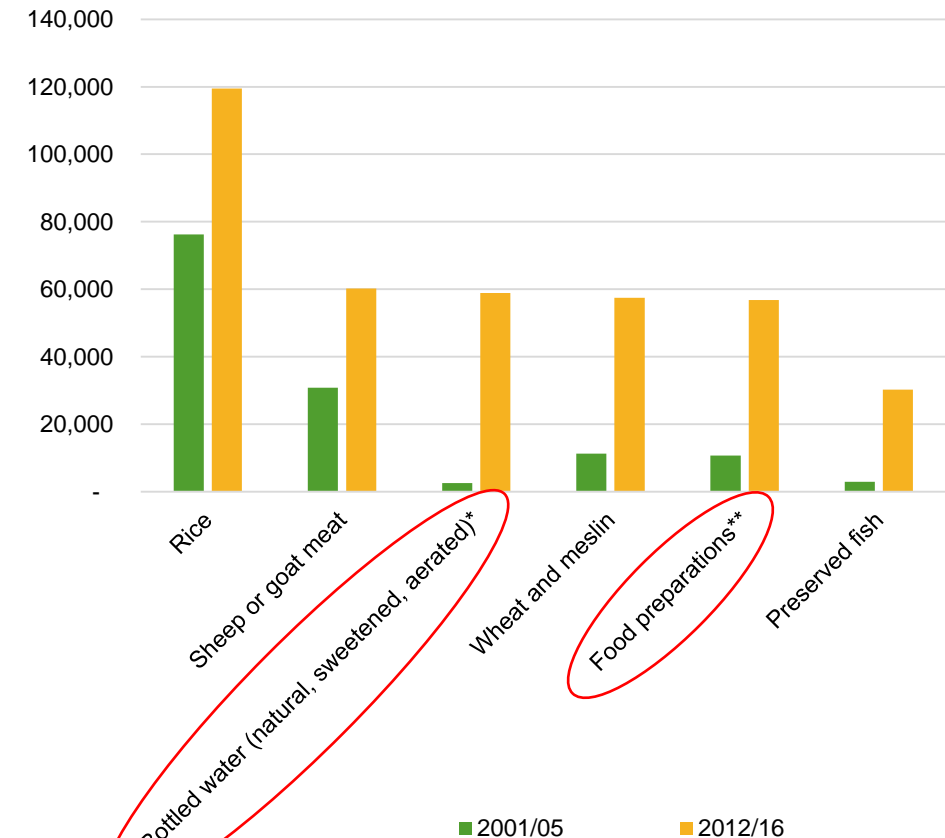
Not very helpful. But, you can find some detailed explanation here <https://www.findhs.codes/HTSCodes/Of-Heading-2106>

This looks like sweetened drinks. But, lets check the codes at the website:

<https://www.findhs.codes/HTSCodes/Of-Heading-2202>

HTS Code	Description
2202	Waters, including mineral waters and aerated waters, containing added sugar or other sweetening matter or flavored, and other nonalcoholic beverages, not including fruit or vegetable juices of heading 2009:
2202.10.00	- Waters, including mineral waters and aerated waters, containing added sugar or other sweetening matter or flavored
	-- Carbonated soft drinks:
2202.10.00.20	--- Containing high-intensity sweeteners (e.g., aspartame and/or saccharin)

Value of largest agri-food imports in 2012-2016 (Real 2014 USD)



How can we look at this change in demand for sugary drinks in a more systematic manner using the BACI data?

Maybe we should look at demand for all food types in order to give us some perspective??

- A couple of things that we have heard about in PNG and in the literature:
  - A large share of the **PNG population does not eat enough protein** → this is important because protein and amino acids are important for child growth ([Schmidt et al., 2020](#); [Ghosh et al., 2016](#); [Semba et al., 2016](#))
  - A growing share of the **urban population is becoming overweight or obese in PNG**, some of this trend has been attributed to poor diets containing a large share of **ultra-processed** and **sugary** foods ([Thow, 2009](#); [Snowden, 2013](#))

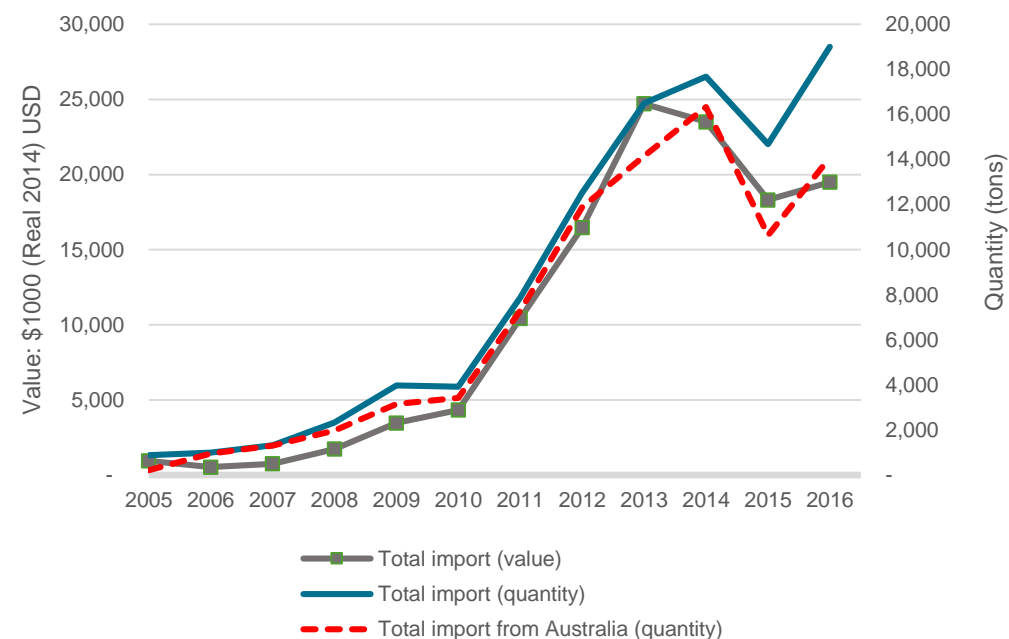
What can the BACI data tell us about agri-food demand over the last several decades?

# Let's look at protein-dense sources of food first to see what the story is...

Values of top 10 agri-food imports of 2012/16 and their values in 2001/05  
(Real 2014 USD)

Agri-food imports	2001/05	2012/16	% annual growth rate per capita
Rice	76,237	119,513	1.9%
Sheep or goat meat	30,837	60,232	3.9%
Bottled waters (natural, sweetened, aerated)*	2,529	58,838	30.2%
Wheat and meslin	11,307	57,463	13.4%
Food preparations**	10,669	56,813	13.9%
Preserved fish	2,967	30,198	20.8%
Palm oil	2,807	23,018	18.4%
Animal feed preparations	7,168	21,886	8.3%
Pasta	1,080	20,793	28.0%
Poultry	649	20,593	33.9%
Sub-total of top 10	146,250	469,348	8.7%
Total value of agri-food imports	268,373	798,370	8.0%
Top 10 commodities share of agri-food imports	54.5%	58.8%	

Value and quantity of poultry imports (2005-2016)



- Protein-dense, animal source imports have increased substantially over time, especially poultry and preserved fish
- We can look more into the data (for example poultry) to see when imports started to increase, and who is the trading partner. Begin to think about opportunities and risks for trade in this specific sector.
- Animal feed preparations have also increased – suggesting increased domestic production of animal source protein foods

## Question: Animal-source products are increasing, but we don't know if these are ultra-processed (less healthy) products, or diet improving products. **What should we do to evaluate this??**

- There has been a lot of nutrition work done on how to classify food groups. We will borrow from these classifications in order to classify our import data
  
- NOVA classification system to classify agri-food process levels (we have put this classification description in your 'Documents' folder for this course):
  - 1) minimal processed or unprocessed;
  - 2) processed culinary ingredients (e.g. oil, sugar);
  - 3) processed food (e.g. preserved vegetable/ fruit/ fish/ meat);
  - 4) ultra-processed foods (e.g. pasta, sausages, sugary beverages, things with lots of ingredients).
  
- We consider processed food imports to include levels 2 – 4 defined above.
  
- In order to classify import goods by the NOVA classification system, we will use the 4-digit HS code and the 6-digit HS code database. We can always refer to the 6-digit code if we aren't sure what is included in the food groups when aggregated by 4-digit.

# Share of ultra-processed food and processed food imports, BACI 4-digit code

Food category and type	4-digit HS code	Share in ultra-processed food imports			Share in total processed food imports		
		2001/05	2012/16	Difference	2001/05	2012/16	Difference
<b>Sugary food</b>							
Coffee mate	903	0.0	0.0	0.0	0.0	0.0	0.0
Sugar confectionery	1704	6.4	4.4	-2.0	3.5	2.8	-0.7
Chocolate	1806	2.5	1.1	-1.4	1.4	0.7	-0.7
Malt extract	1901	5.9	4.7	-1.3	3.3	3.0	-0.3
Jams, fruit puree	2007	0.7	0.4	-0.3	0.4	0.3	-0.1
Fruit/ vegetable juices	2009	5.1	3.2	-1.9	2.8	2.0	-0.8
Coffee concentrate, tea or mate	2101	1.8	2.3	0.6	1.0	1.5	0.5
Non-alcoholic drinks (including soft drinks)	2202	5.5	23.1	17.6	3.0	14.7	11.7
<b>High saturated fat food</b>							
Margarine	1517	7.5	2.9	-4.6	4.1	1.8	-2.3
Sausages and products	1601	0.2	0.5	0.3	0.1	0.3	0.2
Sweet biscuits, wafers	1905	4.6	5.1	0.5	2.5	3.2	0.7
Potato chips	2005	1.6	0.6	-1.0	0.9	0.4	-0.5
Ice cream	2105	0.9	0.7	-0.2	0.5	0.4	-0.1
Food preparations	2106	23.2	22.3	-1.0	12.8	14.2	1.4
<b>Other ultra-processed</b>							
Pasta	1902	2.4	8.2	5.8	1.3	5.2	3.9
Tapioca	1903	0.0	0.0	0.0	0.0	0.0	0.0
Cereal products	1904	1.8	0.8	-0.9	1.0	0.5	-0.4
Yeasts	2102	3.1	1.1	-2.0	1.7	0.7	-1.0
Sauces and preparations	2103	8.4	4.1	-4.3	4.6	2.6	-2.1
Soups and broths	2104	3.2	1.1	-2.1	1.8	0.7	-1.1
Vinegar	2209	0.1	0.1	0.0	0.0	0.0	0.0
Tobacco	2401	3.9	1.3	-2.6	2.1	0.8	-1.3
Cigars	2402	0.6	1.0	0.4	0.3	0.6	0.3
Manufactured tobacco	2403	4.9	2.8	-2.1	2.7	1.8	-0.9
Albumins	3502	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total shares</b>		100	100		55.2	63.7	



- High-saturated / ultra-processed meat imports have not changed much over time
- However, sugary drinks have increased substantially, and make up the largest share of processed imports
- Processed grains (such as pasta) have increased, however not to the degree of sugary drinks

## Let's just make sure that our processed meat hypothesis is true...

### Import per capita (Real USD 2014) of animal meat

Food group	2001/05	2012/16
<b>Animal meat</b>		
Sheep/goat	4.95	7.58
Poultry meat	0.10	2.59
Bovine frozen	1.57	2.33
<b>Prepared or preserved meat</b>	<b>0.61</b>	<b>2.06</b>
Edible offal	0.35	1.67
Swine	0.09	1.23
Other meat and edible offal	0.16	0.19
<b>Sausages</b>	<b>0.01</b>	<b>0.17</b>
Poultry live	0.06	0.16
Bovine fresh	0.03	0.13
<b>Total meat</b>	<b>7.98</b>	<b>18.20</b>
<b>Share of processed meat in total meat imports</b>	<b>7.9%</b>	<b>12.2%</b>

- By looking at all of the meat import categories in the BACI database, we see that increases in animal-source products are mostly not- or minimally-processed.
- Further evaluation of specific meat items would provide greater insight as to specific changes in food demand and preference

# Share of ultra-processed food and processed food imports, BACI 4-digit code

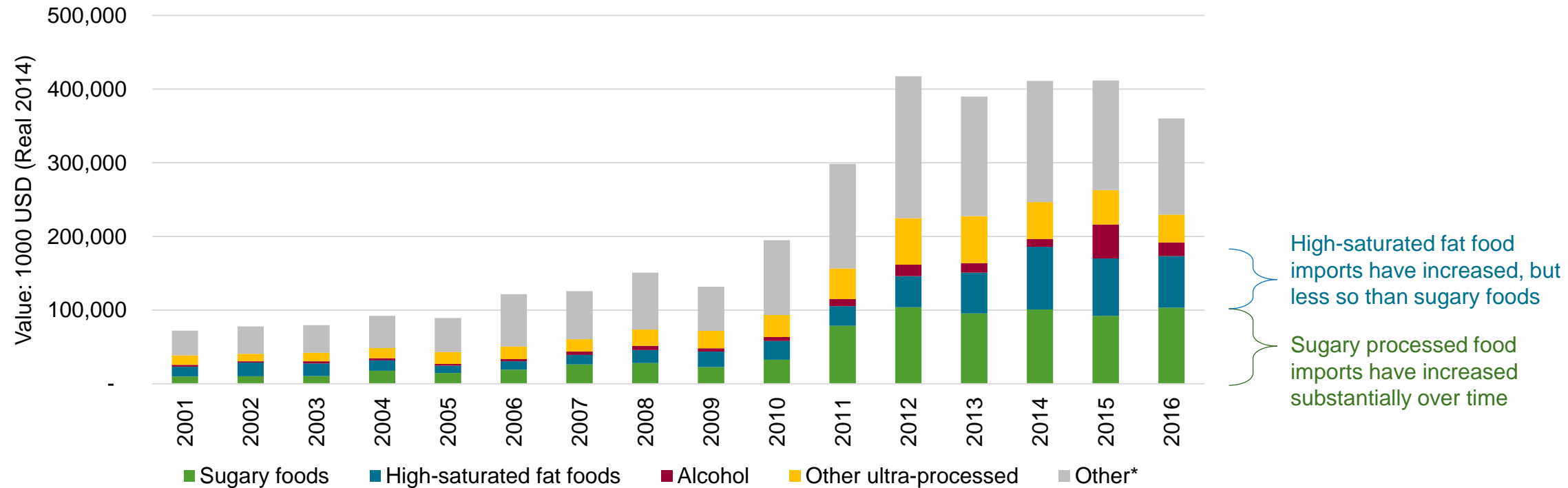
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Albumins	3502	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total shares</b>		100	100		55.2	63.7	

Can we think of an easier way of presenting these data?



# Overall trend in processed agri-food imports over time

Value of processed food imports in 1000 USD (Real 2014)



**Note:** \*Other ultra-processed includes tobacco products, pasta, packaged soups/sauces, etc. \*Other is equivalent to processed culinary ingredients imports (level 2, e.g. oil, sugar), and basic processed foods imports (level 3, e.g. preserved vegetable/fruit)

**Question:** Meat does not seem to driving increases in **ultra-processed** food imports, but could it be driving increases in **processed** food imports? If so, what type of processed meat products? → I challenge you to find out!

**Question:** Can you create a graph like this that only has **ultra-processed** food imports? Then, start to look at the patterns that you see.

Given that BACI is a global, harmonized database, we can use it to compare across countries → let's see what others are importing

## Share of less-healthy food groups in total ultra-processed foods (2012-2016)

Country	Share of ultra-processed foods in total agri-food imports	Share of food type within ultra-processed agri-foods			
		High-saturated fat	Sugary foods	Alcohol	Other ultra-processed
Marshall Islands	45.3	54.1	14.6	6.6	24.7
Vanuatu	42.9	35.4	22.3	17.2	25.0
East Timor	40.2	14.0	28.1	15.4	42.5
French Polynesia	36.0	44.1	27.0	11.4	17.4
Tonga	32.5	32.7	25.9	8.7	32.7
Papua New Guinea	31.5	32.6	38.3	8.4	20.7
Kiribati	30.7	14.3	13.2	14.0	58.4
Solomon Islands	28.0	19.4	29.5	12.6	38.5
Micronesia	27.9	34.8	22.3	14.1	28.8
Samoa	27.5	30.0	25.8	5.8	38.4
Philippines	24.8	33.5	32.9	8.7	24.8
Malaysia	17.2	26.3	30.4	15.9	27.4
Fiji	15.1	29.6	27.0	24.5	18.9
Indonesia	13.3	27.4	28.4	3.8	40.4

What does this consist of?

What does this consist of?

- 31.5 percent of PNG's agri-food imports are ultra-processed (most ultra-processed food is less healthy)
- The largest share of ultra-processed food imported consists of sugary foods – compared to other countries in the region, this is quite high
- The Philippines also has high sugary-food imports, and similar high-saturated fat imports as PNG. Are these imports comparable between the two countries? Is there anything to be learned between these two countries?

## Conclusion

- Objective: Inform policy and programs centered on agriculture, nutrition and food system resilience within PNG
- Significant challenges exist to sufficiently meet the dietary needs of rural people in PNG
  - High child stunting rates
  - Insufficient dietary diversity
  - Unexpected food shortages due to production shocks or marketing challenges (COVID-19)
- As researchers, analysts, and policy makers, our goal is to seek out *trustworthy* datasets and *robust* analysis → careful analysis of the BACI dataset can provide useful information for a variety of policy questions.



# Thank you



Lots of resources on analysis and data in PNG: <https://www.ifpri.org/country/papua-new-guinea>

Link to project note that discusses agri-food trade trends in PNG using the BACI dataset:  
<https://www.ifpri.org/publication/agri-food-trade-trends-papua-new-guinea-reflections-covid-19-policies-and-dietary-change>