Article

Extractivism and Unjust Food Insecurity for Peru's Loreto Indigenous Communities

Caterina Rondoni

Environmental Sustainability and Wellbeing, Department of Humanities, University of Ferrara, 44121 Ferrara, Italy; caterina.rondoni@unife.it

Abstract: Background. Many scholars have examined Indigenous food security and sovereignty yet the topic still represents a small share of environmental justice scholarship. Therefore, we completed a case study of the environmental justice challenges concerning food security faced by the Indigenous communities of Peru's Loreto region. **Methods.** During 2019, we conducted fieldwork in 64 Indigenous communities of Kukama Kukamiria and Urarina in the Amazon rainforests of Loreto, Peru. Based on a semi-stratified sample and snowball sampling method, we combined participant observation with 139 interviews focused on feeding habits, production and availability, access, utilization, food stability, and perception of food insecurity with the Food Insecurity Experience Scale (FIES) method. **Results.** Analyzing these themes led to worrisome assessments of the food insecurity and institutional limits of Indigenous communities. Because of their geographic location, these communities experience a degraded and unhealthy environment with water and food contaminated by hydrocarbon extraction activity. Furthermore, Peru's policy of food and nutrition security has public management deficiencies especially in the Loreto region. Thus, many of the efforts adopted remain ineffective. **Conclusion.** Indigenous communities that live following ancestral culture often lack resources to change their diets. Thus, they frequently suffer the most following the contamination of an environment with which they experience an interdependent relation.

Keywords: food security; food insecurity; environmental justice; Indigenous communities; oil pollution; Latin America

Supplementary materials

Section SA – Main Social Indicators
Source: INEI, Loreto. Compendio Estadístico 2017. Available online: https://www.inei.gob.pe/media/MenuRecursivo/publicaciones_digitales/Est/Lib1501/libro.pdf

Table S1 Population census 2017 by urban and rural area (national and regional comparison).

	Total population		Urban		Rural	
	Number	%	Number	%	Number	%
National	29 381 884	100	23 311 893	79.3	6 069 991	20.7
Loreto Region	883 510	100	606 743	68.7	276 767	31.3

Table S2: Census 2017 population (%) aged 3 and over by urban and rural area according to ethnic self-identification (national and regional comparison).

	Total		Urbana		Rural	
	Peru	Loreto	Peru	Loreto	Peru	Loreto
Quechua	22.3	1.4	18.9	1.5	36.1	1.3
Aimara	2.4	0.1	1.8	0.1	4.6	0.0
Nativo o indígena de la amazonia	0.9	8.3	0.3	2.0	3.4	24.3
Perteneciente o parte de otro pueblo indígena o originario	0.2	1.5	0.1	0.2	0.6	4.9
Negro, moreno zambo, mulato/ pueblo afroperuano o afrodescendiente	3.6	2.7	3.7	3.0	3.1	2.0
Blanco	5.9	1.9	6.3	2.3	4.1	0.9
Mestizo	60.2	75.9	63.9	81.5	45.1	61.6
Otro	1.2	0.4	1.4	0.5	0.4	0.1
No sabe/ No responde	3.3	7.8	3.5	8.9	2.6	2.9

Table S3: Native communities in the total 2017 census and in the Loreto region according to ethnic self-identification.

Indigenous or native people	Total Native Communities surveyed	Native communities registered in the Loreto department	%
Ashaninka	520	3	0.57
Awajún	419	60	14.31
Kichwa	315	215	68.25
Kukama Kukamiria	216	216	100.00
Shawi	185	175	94.59
Shipibo-Konibo	153	45	29.41
Asheninka	113	1	0.88

Achuar	94	94	100.00
Yagua	86	86	100.00
Matsigenka	69	-	-
Yanesha	65	-	-
Wampis	65	19	29.23
Urarina	65	65	100.00
Kandozi	54	54	100.00
Tikuna	38	38	100.00
Yine	30	1	3.33
Nomatsigenga	24	-	-
Murui-Muinani	24	24	100.00
Matsés	19	19	100.00
Harakbut	17	-	-
Cashinahua	16	1	6.15
Kakataibo	14	-	-
Bora	14	14	100.00
Mastanahua	13	-	-
Kapanawa	12	12	100.00
Yaminahua	8	-	-
Secoya	7	7	100.00
Madija	7	-	-
Sharanahua	6	-	-
Shiwilu	5	5	100.00
Maijuna	5	5	100.00
Ikitu	4	4	100.00
Amahuaca	4	-	-
Ese eja	3	-	-
Ocaina	2	2	100.00
Nahua	2	-	-
Kakinte	2	-	-
Arabela	2	2	100.00
Resígaro	1	1	100.00
Quechuas	1	-	-
Marinahua	1	-	-
Jíbaro	1	1	100.00
Chapra	1	1	100.00
Chamicuro	1	1	100.00
Total	*2703*	*1171*	*43.32*

Table S4: Census 2017 population (%) aged 3 and over by urban and rural area according to educational level attained (national and regional comparison).

	Total		Urban		Rural	
	Peru	**Loreto**	**Peru**	**Loreto**	**Peru**	**Loreto**
Without Education	5.0	4.5	2.6	2.2	15.2	10.7
Initial	0.2	0.2	0.2	0.2	0.3	0.2
Primary	19.5	29.3	14.6	21.9	38.9	49.0
Secundary	41.3	43.4	42.4	46.6	36.4	35.0
High school	34.0	22.6	39.9	29.1	9.3	5.1
- **After School No Universitarian**	14.3	10.4	16.5	13.2	5.2	2.9
- **Universitarian**	19.7	12.2	23.4	15.9	4.0	2.2

Table S5: Census 2017 population (%) aged 3 and over by sex and urban and rural area according to educational level attained (national and regional comparison).

	Male				Female			
	Urban		Rural		Urban		Rural	
	Peru	**Loreto**	**Peru**	**Loreto**	**Peru**	**Loreto**	**Peru**	**Loreto**
Without Education	3.29	3.99	9.29	9.03	5.17	4.99	19.88	14.40
Initial	5.39	6.65	5.56	7.95	5.02	6.29	5.63	8.41
Primary	20.62	28.78	42.84	51.13	23.34	32.50	42.99	54.26
Secundary	39.41	38.33	34.59	27.88	34.57	36.59	25.78	20.81
Basic special (Básica especial)	0.17	0.15	0.03	0.01	0.23	0.19	0.03	0.02
Superior No Universitarian Incomplete	4.76	3.74	1.76	0.96	4.86	3.38	1.42	0.55
Sup. No Universitarian Complete	7.68	6.36	2.59	1.32	8.59	5.33	1.77	0.57
Sup. Universitarian Incompleta	6.34	3.04	1.08	0.37	6.23	3.29	1.01	0.29
Sup. Universitaria Complete	10.68	8.15	2.16	1.26	10.61	6.76	1.36	0.6
Maester/ Ph.D.	1.61	0.77	0.16	0.06	1.35	0.63	0.09	0.06

Table S6: Population in the 2014 census at the national and regional level according to health variables

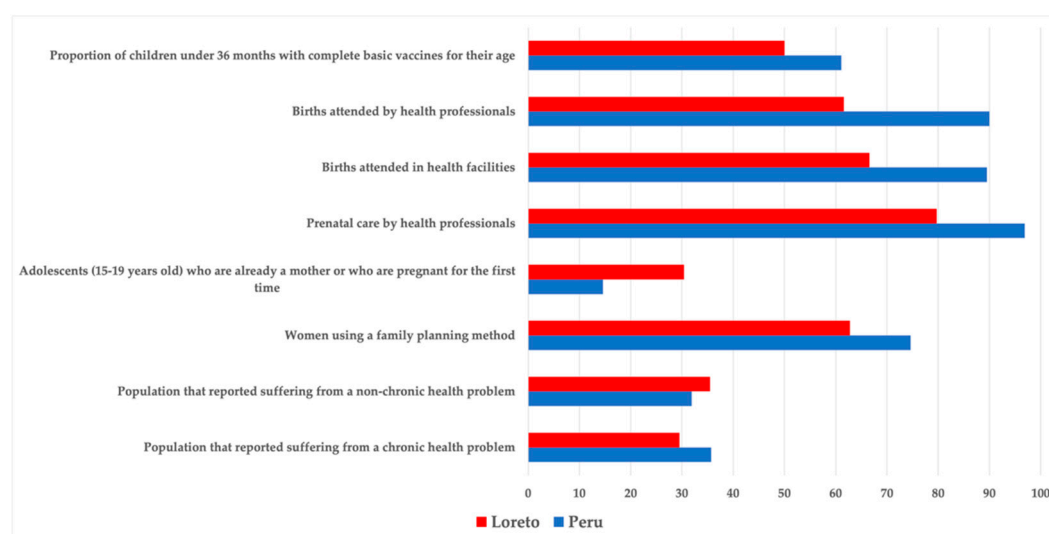|	Peru	Loreto
Health insurance (%)		
Population affiliated with some health insurance	69.0	79.5
Only Peruvian Health Insurance Partner (ESSALUD)	24.6	15.0
Only Comprehensive Health Insurance (SIS)	39.0	60.8
Others	5.4	3.7
Population that reported suffering from a chronic health problem (%)	35.7	29.5
Male	30.9	28.3
Female	40.5	30.6
Population that reported suffering from a non-chronic health problem (%)	31.9	35.5
Male	32.4	33.1
Female	31.4	37.9
Reported cases of tuberculosis	23 296	1 134
Reported Cases of Acquired Immune Deficiency Syndrome (AIDS)	1 254	115
Women using a family planning method (%)	74.6	62.8
Adolescents (15-19 years old) who are already a mother or who are pregnant for the first time (%)	14.6	30.4
Prenatal care by health professionals (%)	96.9	79.7
Births attended in health facilities (%)	89.5	66.6
Births attended by health professionals (%)	90.0	61.6
Proportion of children under 36 months with complete basic vaccines for their age (%)	61.1	50

Figure S1 Population (%) in the 2014 census at the national and regional level according to health variables, national and regional comparison (source: own elaboration from the data of the INEI, Loreto. Compendio Estadístico 2017).

Table S7: Population in the 2014 census at national and regional level according to employment variables

Employee Type	Peru	Loreto
Working Age Population (Thousands of people)	22 668.6	697.1
Economically active population	16 396.4	506.4
Economically Inactive Population	6 272.2	190.7
Occupancy rate (%)	96.3	97.5
Unemployment rate (%)	3.7	2.5
Economically Active Employed Population (Thousands of people)	15 796.9	493.5
Male occupation rate (%)	56.22	61.1
Female occupation rate (%)	43.78	38.9
Economically Active Population Employed by employment (%)		
Formal	27.2	18.1
Informal	72.8	81.9
Average monthly income from work (Nuevos soles)	1229.9	1038.0

Section SB – Main Economic Indicators
Source: INEI, Loreto. Compendio Estadístico 2017. Available online:
https://www.inei.gob.pe/media/MenuRecursivo/publicaciones_digitales/Est/Lib1501/
libro.pdf

Tabla S8: Gross Value Added 2018, Values at Constant Prices 2007 (thousands of soles)

	Gross Value Added		Structure (%)	
Activities	**Peru**	**Loreto**	**Peru**	**Loreto**
Agriculture, livestock, hunting and forestry	28 495 000	764 000	5.3	8.6
Fishing and aquaculture	2 355 000	35 810	0.4	0.4
Oil, gas, mineral extraction and services	66 463 932	1 618263	12.4	18.3
Manufacturing	71 038 866	634 275	13.3	7.2
Electricity, gas and water	9 845 000	109 016	1.8	1.2
Construction	31 666 000	323 277	5.9	3.6
Commerce	55 659 000	1 514 254	10.4	17.1
Transportation, storage, mail. courier	29 903 000	475 321	5.6	5.4
Accommodation and restaurants	16 789 000	289 727	3.1	3.3

Telecommunications and other information services	23 808 000	312 123	4.5	3.5
Public administration and defense	27 152 000	723 295	5.1	8.2
Other services	123 103 000	2 066 040	23	23.3
Gross value Added	486 277 798	8 865 351	90.9	100.0
Production Tax	44 337 341		8.3	
Import Right	4 080 055		0.8	
Gross Domestic Product	534 695 194		100.0	

Table S9: Census population 2017 (%) at national and regional level according to work activity

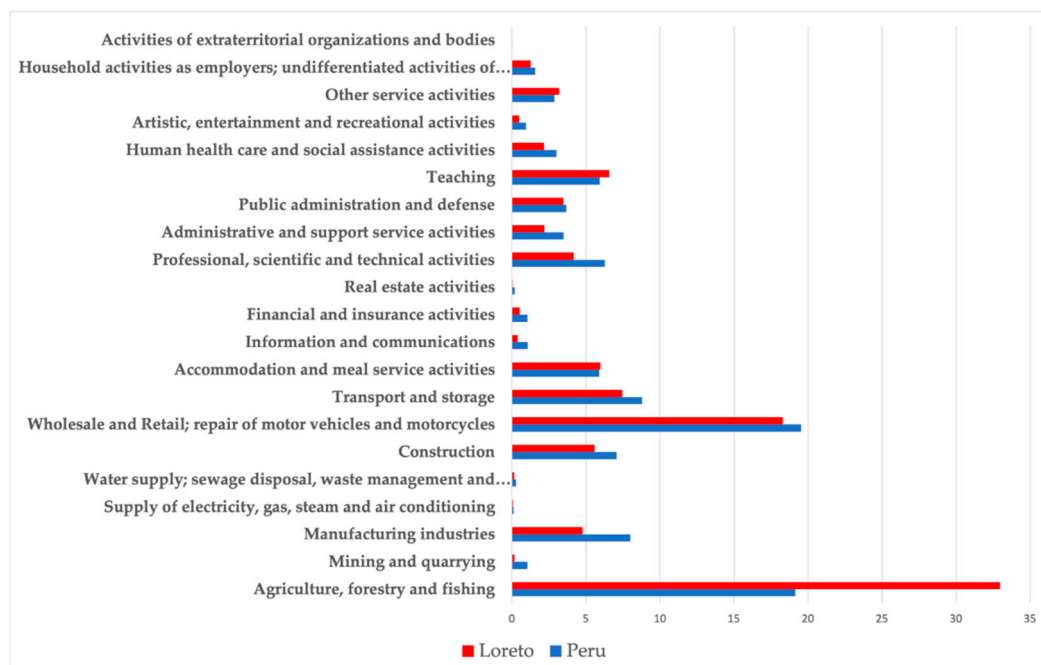| Activities	Peru	Loreto
Agriculture, forestry and fishing	19.13	32.95
Mining and quarrying	1.05	0.18
Manufacturing industries	8.0	4.78
Supply of electricity, gas, steam and air conditioning	0.11	0.08
Water supply, sewage disposal, waste management and decontamination	0.27	0.16
Construction	7.07	5.57
Wholesale and Retail, repair of motor vehicles and motorcycles	19.53	18.30
Transport and storage	8.79	7.45
Accommodation and meal service activities	5.89	5.98
Information and communications	1.08	0.40
Financial and insurance activities	1.06	0.53
Real estate activities	0.19	0.06
Professional, scientific and technical activities	6.28	4.18
Administrative and support service activities	3.50	2.20
Public administration and defense	3.67	3.47
Teaching	5.93	6.58
Human health care and social assistance activities	3.01	2.17
Artistic, entertainment and recreational activities	0.96	0.50
Other service activities	2.88	3.19
Household activities as employers, undifferentiated activities of households as producers of goods and services for their own use	1.57	1.27
Activities of extraterritorial organizations and bodies	0.01	0.00

Figure S2 Census population 2017 (%) at national and regional level according to work activity (source: own elaboration from the data of the INEI, Loreto. Compendio Estadístico 2017).

Section SC – Kukama-Kukamiria native communities surveyed in 2017 according to socio-economic characteristics. Source: INEI, Censos Nacionales 2017: XII de Población, VII de Vivienda y III de Comunidades Indígenas. Available online: https://www.inei.gob.pe/media/MenuRecursivo/publicaciones_digitales/Est/Lib1539/libro.pdf

Characteristics of native communities Kukama-Kukamiria	N. community	%
Total native communities	216	7.9
Affiliation to any federation or organization	159	73.6
Recognized Communities	208	96.3
Native communities with property title	134	64.4
Native communities with conflicts	46	21.3
- Community member	5	10.9
- Other native and / or peasant communities	32	69.6
- Private persons	7	15.2
- Oil companies	3	6.5
- Timber companies	3	6.5
- Mining companies	1	2.7
- Informal Miners	-	-
Native communities with communication service	132	61.1
Native communities with communal use infrastructures	141	65.3

Native communities by means of communication to get from the district capital to the community		
- River / lake route	206	95.4
- Horseshoe / trail	16	7.4
- Carriage way	7	3.2
- Affirmed road	10	4.6
- Paved road	1	0.5
- Airway	-	-
Native communities registered by social programs that benefit the community		
- Food Supplementation Program (PANTBC)	6	2.7
- Qali Warma Program	209	96.7
- Educational materials	127	58.8
- Beca 18 Program	37	17.1
- CUNA MÁS Program	64	29.6
- Pensión 65 Program	189	87.5
- Comprehensive Health Insurance (SIS)	216	100
- Diarrheal Disease Control Program	53	24.5
- JUNTOS Program	196	90.7
- TAMBOS Program	7	3.2
- Literacy Program	12	5.5
- Vaccine Program (immunizations)	86	39.8
- Sembrando Program (improved kitchen)	30	13.9

Section SD – Urarina native communities surveyed in 2017 according to socio-economic characteristics.
Source: INEI, Censos Nacionales 2017: XII de Población, VII de Vivienda y III de Comunidades Indígenas. Available online: https://www.inei.gob.pe/media/MenuRecursivo/publicaciones_digitales/Est/Lib1539/libro.pdf

Characteristics of native communities Kukama-Kukamiria	N. comunidad	%
Total native communities	65	
Affiliation to any federation or organization	63	96.9
Recognized Communities	65	100
Native communities with property title	42	64.6
Native communities with conflicts	15	23.1
- Community member	3	4.6
- Other native and / or peasant communities	9	13.8
- Private persons	1	1.5
- Oil companies	3	4.6
- Timber companies	1	1.5
- Mining companies	-	-

- Informal Miners	-	-
Native communities with communication service	17	26.1
Native communities with communal use infrastructures	41	63.1
Native communities by means of communication to get from the district capital to the community		
- River / lake route	62	95.4
- Horseshoe / trail	-	-
- Carriage way	-	-
- Affirmed road	1	1.5
- Paved road	-	-
- Airway	-	-
Native communities registered by social programs that benefit the community		
- Food Supplementation Program (PANTBC)	2	3.1
- Qali Warma Program	61	93.8
- Educational materials	21	32.3
- Beca 18 Program	6	9.2
- CUNA MÁS Program	13	20
- Pensión 65 Program	47	72.3
- Comprehensive Health Insurance (SIS)	63	96.9
- Diarrheal Disease Control Program	19	29.3
- JUNTOS Program	56	86.1
- TAMBOS Program	2	3.1
- Literacy Program	4	6.1
- Vaccine Program (immunizations)	22	33.8
- Sembrando Program (improved kitchen)	6	9.2

Section SE- Questionnaire on nutrition in indigenous populations

Comunidad:

Edad:

Genero:

Función en la comunidad:

Composición del hogar:
　　　　Número de niños (edades y sexo).
　　　　Número de adultos (edades y sexo)

1. Que sueles producir en la chacra?

a. Arroz   b. Yucca   c. Tomate.   d. Platano   e. Pepino.   f. Aji   g. Papaya

2. Has notado cambios en la producción de chacras? Si es así, ¿hace cuánto tiempo empezó a disminuir la productividad del campo (es decir, la cantidad de alimentos producidos por el campo) y comò es la production ahora?

3. Que son las plantas que se recolectan en el monte para comer?

4. Que sueles pescar?

a. Bocachico   b. Palometa   c. Zungaro   d. Carachama   e. Sardina   f. Scirus   g. liza

5. Has notado cambios en la cuantidad de pescado y en el tamaño? ¿Se Si como era antes y como es ahora?

6. Que animales sueles criar?

a. Pollo.   b. Cerdo.   c. Carne del monte (especificar abajo)

7. La mayoría de la comida que consuman la producen ustedes o la compran?   a. autoconsumo b. compra

8. Que tipo de comida compran?

9. Donde compran la comida que no producen?

10. Alguien en la familia trabaja afuera de la comunidad?

a. vende mercado   b. artesanía   c.   otro

11. Con qué frecuencia comes a el día?   a. una vez   b. dos veces   c. tres veces   d. más

12. Cuando comes?

13.   Que sueles comer?

a. pescado   b. carne   c. yuca   d. papas   e. plátanos   f.arroz   g.otras cosas (especifique abajo)

---

14. ¿Cuántas veces a la semana comes pescado?   a. cuatro veces   b. cinco veces   c. más   d. todos los dias

¿Y cuántas veces al día?   a. una vez   b. dos veces   d. más

15. Que agua tomas?   a. agua del río   b. agua embotellada.   c. plante de agua   d.otra

¿Tratan en cualquier manera el agua que toman? ¿Se Si como?

---

16. ¿Cuánta agua tomas por dias (litros u otras unidades de medida, como botellas o frascos)?

17. Cuales son los ingredientes que intentan de no hacer faltar nunca en la cocina?

---

18. Inseguridad alimentaria

- ¿En las últimas cuatro semanas, ha estado usted preocupada porque en su familia no tenían suficiente comida?   a.SI b.NO

- ¿En las últimas cuatro semanas, usted o algún miembro de su familia no ha podido comer el tipo de comida de su preferencia por falta de recursos? a.SI b.NO

- ¿En las últimas cuatro semanas, usted o algún miembro de su familia ha comido una limitada variedad de alimentos por falta de recursos? a.SI b.NO

- ¿En las últimas cuatro semanas, usted o algún miembro de su hogar ha comido menos alimentos de los que usted siente que necesitaba porque no había suficiente comida?

a.SI b.NO

- ¿En las últimas cuatro semanas, usted o algún miembro del hogar, se ha saltado alguna comida del día porque no había suficiente comida? a.SI b.NO

- ¿En las últimas cuatro semanas, usted o algún miembro de su hogar, se ha ido a dormir por la noche con hambre porque no había suficiente comida? a.SI b.NO

- ¿En las últimas cuatro semanas, usted o algún miembro de su hogar, ha pasado todo el día y noche sin comer nada porque no había suficiente comida? a.SI b.NO

19. Que actividades extrativas se desarrollan en la zona?   a. Petroleo   b. Madera   c. Mineria   d. Otras.

20. Ustedes crees que el agua y el pescado estan contaminados en estas zonas? Porque? ¿Has notado algo extraño en el pescado que podría ser conectado con la contaminación?

21. Que mega proyectos se ejecutan en la zona, conoces alguno? Y que pensa sobre esto?

   a.   Construcción de puentes   b. Hidrovias   c. Represas.   d. Otros

22. Cree Usted que alguna de las actividades extractivas o mega proyectos afectan el agua o los alimntos que consumen?
a. Si b. No
Porque?

23. Te has enfermado por consumir el agua y los peces?   a.   SI b. NO

¿A qué crees que se debe que tengas alguna enfermedad por consumir el agua y los peces?

24. Que tipo de enfermedad has tenido?

a. diarrea   b. vómitos c. dolor de estómago   d. dolor de cabeza   e. infecciones   f. gripe   g.   fiebre
      h. bronquitis   i. hongos de la piel

Section SF- In field research results

Tabla S10 Summary of feeding habits in the ACODECOSPAT communities

Feeding Habits	
How many times do they eat a day	- 2 times: 74.8% - 3 times: 25.2%
What they usually eat	- Fish: 93.5% - Meat: 32.3% - Bananas: 71.2% - Corn: 7.2% - Yucca: 56.1% - Potato: 5% - Rice: 54.6%
Ingredient that can not be missing in the kitchen	- Fish: 99%
Times a week they eat fish	- Every days: 75.5% - 4 times: 7.9% - 6 times: 5.7% - 3 times: 5.7% - 5 times: 4.3%
Times a day they eat fish	- 1 time: 15.9% - 2 times: 71.6% - More then 2 times: 12.5%
Water	
Water for drinking, cooking, washing	- river water: 88.5% - well water: 2.2% - rain water: 5.8% - bottled water: 0.7%
How they treat river water	- chlorine: 35.9% - purification plant: 26.5% - nothig: 26.5% - boiling: 6.3% - sediments: 4.7%
Vegetables and Plants	
Main products of the farm	- Yucca - Corn - Rice - Cucumber - Banana - Papaya
Plantas del bosque	- Aguaje - Chonta - medicinal plants
Fish and meat	
Main fish consumed	- Boquichico - Fasaco - Palometa - Zungaro

	- Carachama - Liza - Sardina
Main meat consumed	- Chicken - Won - Pork - Bush meat - Duck

Tabla S11 Summary of the aspects related to Availability, Access, Utilization, Stability of food in ACODECOSAPT com-munites

Availability, Access, Utilization, Stability	
Consumption typology	
Self-consumption	- Vegetables and Plants - Fish and meat
Products purchased	- Rice - Noodles - Sugar - Biscuits - Oil - Soda - Salt
Shop place	- Nauta - Stores in the community - They buy in other communities - Peddlers
Family work or other forms of income	
Only internal work to the community	48.1%
Also work outside the community (sale in the market, work by company)	51.9%
Perception in production change	
Change in farm production?	Yes: 92%
Kind of change	Decrease in production. The plants do not grow as before and are black as they would have been burned.
Are there changes in fishing activity?	Yes: 95%
Kind of change	Decrease in fish availability and fish size.
Perception of contamination	
They think the water and fish are contaminated	Ye: 97.3%
They have noticed something strange in the fish that could be connected to the contamination	Yes: 35.5%
They think that extractive activity affects the water and food they consume	Yes: 82.7%
They think they have gotten sick from consuming the water and fish	Yes: 82.3%
Disease typology	- Diarrhea - Fever - Vomiting - Bronchitis

	- Stomach ache - Skin problems
	- Headache - Parasitosis
	- Infections

Table S12. Results collected with the FIER method

Food insecurity according to the FIES method	
Mild insecurity	25.6%
Moderate insecurity	65.9%
Serious insecurity	8.5%