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# Vulnerability to Poverty of Female-Headed Fishing Households in the Philippines



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# Introduction

- Fishers are among the poorest people in the Philippines.
- The fisheries sector reported a poverty rate of 27.4%, the second-highest poverty incidence after Indigenous People in 2023 (Philippine Statistical Authority, 2025).
- Poverty incidence in the fisheries sector is consistently higher than the national poverty incidence: **26.2%** vs 16.7% in 2018, **30.2%** vs 18.1% in 2021, and **27.4%** vs 15.5% in 2023.
- Fishers are the most vulnerable groups due to high exposure to natural, health-related or economic shocks and disasters (Allison et al., 2006)

Poverty Incidence among Farmers, Fishers and Indigenous People, 2021-2023 (in percent)



Source: Merged FIES-LFS datafiles in 2018, 2021, & 2023, Philippine Statistics Authority

# Introduction

- High levels of poverty among fisherfolk are well-documented, yet there is limited research on the vulnerability of female-headed fishing households to poverty.
- Existing studies focus on causes of poverty such as overfishing, poor governance, and market shocks rather than household-level vulnerabilities. While gender studies in fisheries exist, they rarely examine female-headed households as a distinct group in terms of their susceptibility to poverty.
- Female-headed households face unique challenges such as limited access to resources, the burden of roles, and marginalization in both community and household decision-making. Addressing this gap is essential for developing gender-responsive policies and advancing SDGs 5 (Gender Equality) & 14 (Life Below Water).
- Understanding vulnerability enables policymakers to identify at-risk groups early, allocate resources more effectively, and design interventions that prevent future poverty rather than merely responding to it.

# Research Questions

**This study aims to understand the nature and characteristics of women's poverty in the Philippine fisheries sector and determine the probability of women fishers falling into poverty in the future. Specifically, it aims to answer the following research questions:**

- What are the characteristics of female-headed fishing households in the Philippines?
- What is the level of vulnerability to poverty among female-headed fishing households in the Philippines?
- Which groups have the highest probability of falling into poverty in the future?
- How have these characteristics and probabilities changed between 2018 and 2021?
- What can the government and relevant institutions do to address the vulnerability of female-headed fishing households to poverty?

# Vulnerability as Expected Poverty (Chaudhuri, 2003)

- Vulnerability is forward-looking and unobservable, unlike poverty which can be measured using monetary or non-monetary indicators against a poverty line.
- Vulnerability assessment relies on modeling household behavior over time to estimate future risk and predict vulnerability status.
- Chaudhuri (2003) proposed an examination of cross-sectional data on household (and community) characteristics that put households at risk of experiencing future poverty.
- The model allows for the estimation of the chance of a household being poor in the future when panel data is not available.

# Data and Methodology

- Data: merged 2018 and 2021 Family Expenditure Survey and Labor Force Survey from the Philippine Statistics Authority.
- Extracted households working in the fisheries sector.
- Variables used to predict log of per capita consumption and vulnerability:

Variables	Description
<i>lnpcinc</i>	Log of annual per capita income of household.
<i>dep_ratio</i>	Dependency ratio of the household.
<i>hhage</i>	Age of household head.
<i>educ</i>	Years of schooling of household head.
<i>roof_ind</i>	Dummy variable: 1 if roof is made of concrete or metal roofing, 0 otherwise (i.e. light or makeshift/improvised materials).
<i>wall_ind</i>	Dummy variable: 1 if wall is made of concrete materials, 0 otherwise.
<i>tenure</i>	Dummy variable: 1 if house is owned, 0 otherwise
<i>ojob</i>	Dummy variable: 1 if household head has other source of income, 0 otherwise.
<i>typh</i>	Dummy variable: 1 if household experienced super typhoon in their province or city, 0 otherwise.
<i>rprov</i>	Province/Highly Urbanized City ID.

# Data and Methodology

## Empirical Strategy in Estimating Vulnerability as Expected Poverty

- Feasible Generalized Least Squares Approach and used per capita income data (Albert & Vizmanos ,2018).

- Estimate  $\widehat{\ln pcinc}$  using OLS

$$\ln pcinc_i = X_i\beta + \varepsilon_i \quad (\text{equation 1})$$

- Conditional variance: compute residuals  $\widehat{\varepsilon}_i$  and form  $\widehat{\varepsilon}_i^2$

- Estimate  $\widehat{\varepsilon}_i^2$   $\varepsilon_i^2 = X_i\theta + \mu_i$  (equation 2)

to predict  $\widehat{\sigma}_i^2$  and take  $\widehat{\sigma}_i$

- Compute for vulnerability (probability) as:

$$V_i = \Phi \left[ \frac{\ln pc pov - \widehat{\ln pcinc}_i}{\widehat{\sigma}_i} \right]$$

where  $pc pov$  = per capita annual poverty threshold in the region.

- A household is vulnerable if  $V_i > 0.5$

# Results: Summary Statistics

Variable	Mean		Standard Deviation		Minimum		Maximum	
	2018 (n=88)	2021 (n=131)	2018 (n=88)	2021 (n=131)	2018 (n=88)	2021 (n=131)	2018 (n=88)	2021 (n=131)
<i>pcinc</i>	52770.41*	57196.97	48860.55	65931.12	16469	15718	286629.1	709750
<i>dep_ratio</i>	0.04	0.66	0.19	0.88	0	0	1	4
<i>fsize</i>	4.41	3.95	2.48	2.01	1	1	14	10
<i>hhage</i>	52.93	54.37	12.91	12.90	23	25	77	80
<i>educ</i>	9.42	2.05	4.59	5.73	0	0	20	18
<i>roof_ind</i>	0.59	0.78	0.49	0.42	0	0	1	1
<i>wall_ind</i>	0.63	0.76	0.48	0.43	0	0	1	1
<i>tenure</i>	0.89	0.68	0.32	0.47	0	0	1	1
<i>ojob</i>	0.13	0.16	0.33	0.37	0	0	1	1
<i>urb</i>	0.19	0.19	0.40	0.40	0	0	1	1
<i>pcpov</i>	25645.92*	28200.31	1377.15	1901.60	23315	26321	27928	32978
<i>typh</i>	0.53	0.64	0.50	0.48	0	0	1	1

\*in PhP, 2018 Prices. 1USD ≈ PhP52.67 on average in 2018. Mean *pcinc* ≈ USD1001.92; *pcpov* ≈ USD486.92

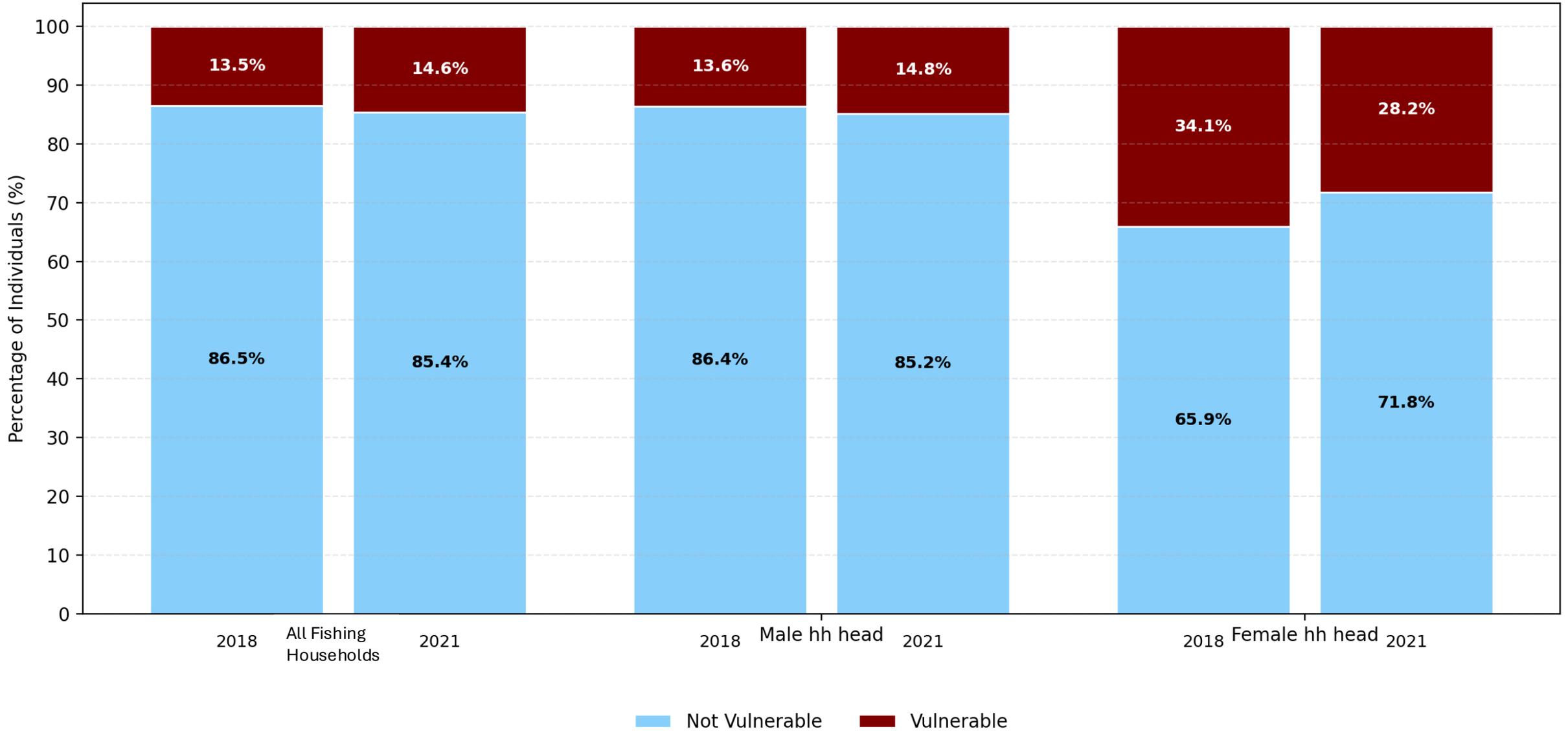
# Results

- Estimated equation 1 and 2 for all fishing households. Sex of household head was a significant predictor of log per capita annual income and income variability.
- Specifically, fishing households with female household head has lower log per capita annual income and has income variability for both 2018 and 2021.
- Estimated equation 1 and 2 for female-headed fishing households → while these factors are not significant predictors of income variability, our focus is on the estimated variance to compute for the probability to fall into poverty.

	Dependent variable: <i>lnpcinc</i>		Variance Regression	
	2018( n=88)	2021 (n=131)	2018 ( n=88)	2021 (n=131)
<i>dep_ratio</i>	-0.248 (0.419)	-0.089 (0.059)	-0.099 (0.175)	0.025 (0.017)
<i>hhage</i>	0.009 (0.008)	0.011*** (0.004)	0.000 (0.003)	0.004*** (0.001)
<i>educ</i>	0.089*** (0.024)	0.015 (0.010)	0.007 (0.010)	0.005 (0.003)
<i>roof_ind</i>	-0.073 (0.198)	0.282** (0.124)	-0.012 (0.083)	0.038 (0.036)
<i>wall_ind</i>	-0.017 (0.233)	-0.043 (0.119)	0.011 (0.097)	0.034 (0.034)
<i>tenure</i>	0.101 (0.231)	-0.028 (0.111)	-0.059 (0.096)	0.024 (0.032)
<i>ojob</i>	0.114 (0.259)	0.065 (0.151)	-0.075 (0.108)	0.031 (0.044)
<i>typh</i>	0.118 (0.608)	-1.457*** (0.612)	0.098 (0.254)	-0.141 (0.177)
<i>Province/ HUC dummy</i>	Yes	Yes	Yes	Yes
<i>constant</i>	8.887*** (0.793)	11.401*** (0.479)	-0.027 (0.331)	-0.213 (0.138)
<i>R-squared</i>	0.714	0.719	0.450	0.621

# Vulnerability Status by Category (2018 vs 2021, % of individuals)

Vulnerability Status by Category (2018 vs 2021, % of individuals)



# VEP by Urban-Rural and Poor vs Non-Poor Classification

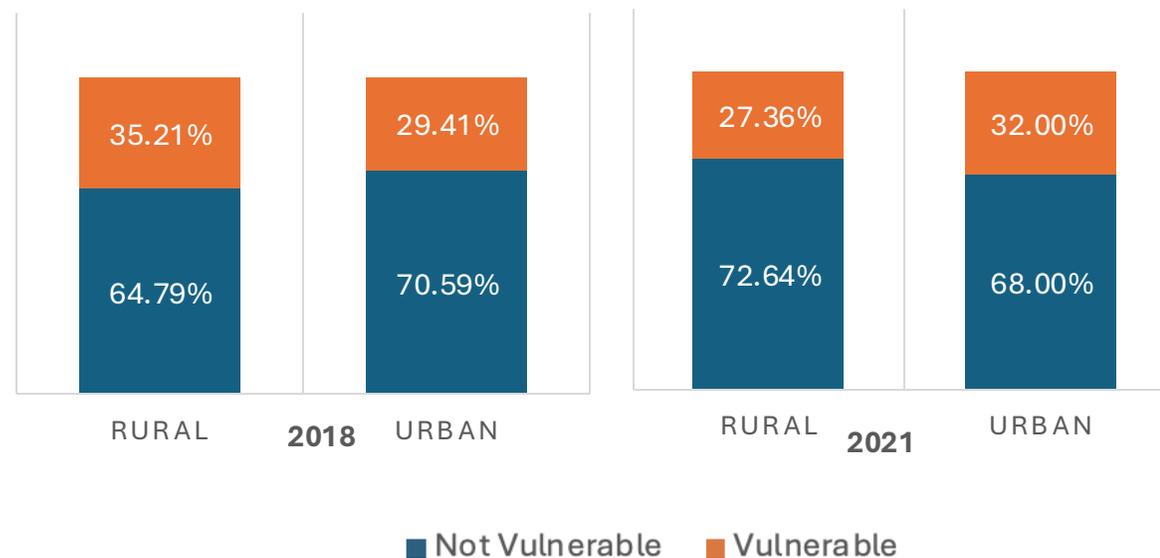
Frequency Distribution of Female-headed Fishing HH (2018 vs 2021)				
	2018 (n=88)		2021 (n=131)	
Poor	20	22.73%	107	81.68%
Non-poor	68	77.27%	24	18.32%
Vulnerable	30	34.10%	37	28.24%
Not vulnerable	58	65.90%	94	71.76%
Urban	17	19.32%	25	19.08%
Rural	71	80.68%	106	80.92%

Mean Probability VEP (2018 vs 2021)		
	2018	2021
Female hh head	0.2412	0.1404
Poor	0.5086	0.3259
Non-poor	0.1521	0.0958
<b>difference</b>	<b>0.3565***</b>	<b>0.2301***</b>
Urban	0.1271	0.1069
Rural	0.2688	0.1474
<b>difference</b>	<b>0.1417*</b>	<b>0.0405</b>

## POOR vs NON-POOR



## URBAN vs RURAL



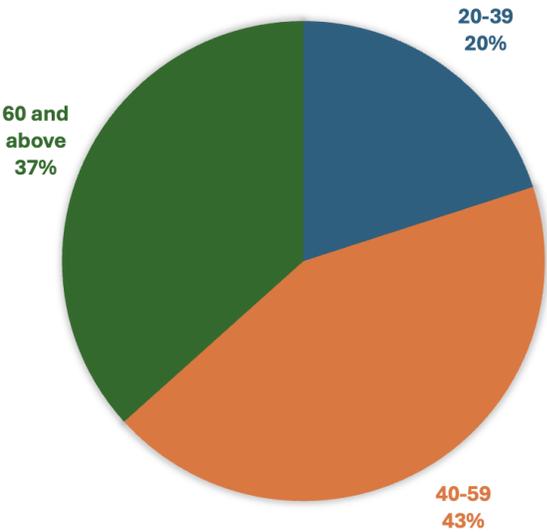
■ Not Vulnerable ■ Vulnerable

# Results and Discussion

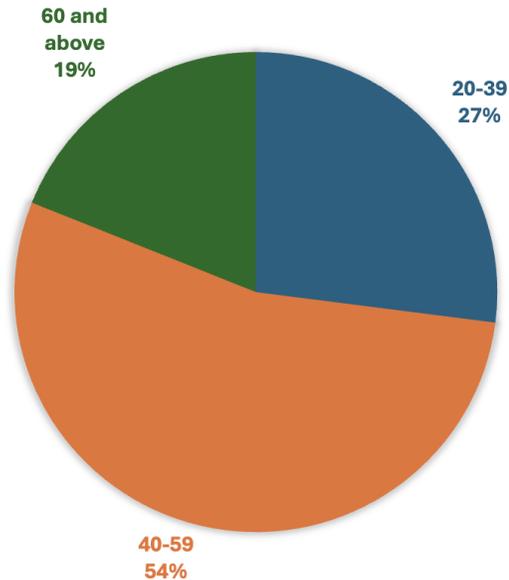
- In both 2018 and 2021, poor households had much higher vulnerability to poverty probabilities than non-poor households. The gap was very large and significant in both years (36 percentage points in 2018 vs. 36 percentage points in 2021).
- In 2018, rural households were significantly more vulnerable than urban ones (14-point gap, significant at 10%). By 2021, the gap narrowed (only 4 points) and was no longer statistically significant, suggesting reduced disparity by location.
- Both poor and non-poor households showed slightly lower vulnerability probabilities in 2021 compared to 2018, implying some improvement over time.
- While location-based differences weakened between 2018 and 2021, the poverty status gap remained wide and persistent, implying poverty itself (rather than rural/urban residence) as the key driver of vulnerability.

# Distribution of Vulnerable Groups by Age and Educational Attainment

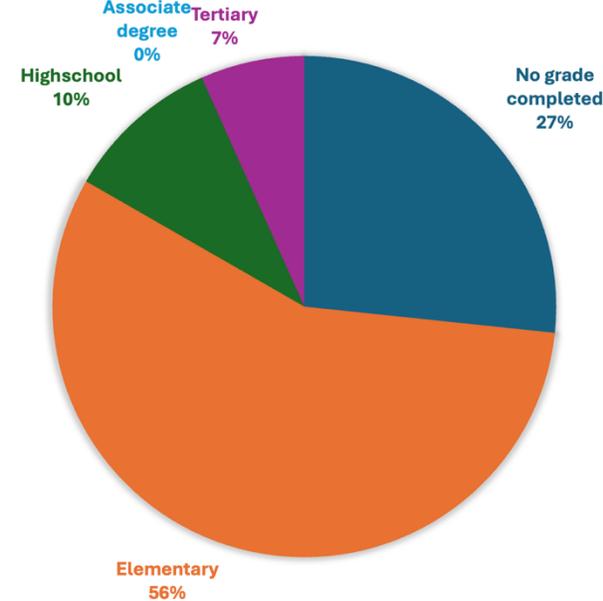
DISTRIBUTION OF VULNERABLE GROUPS BY AGE (2018)



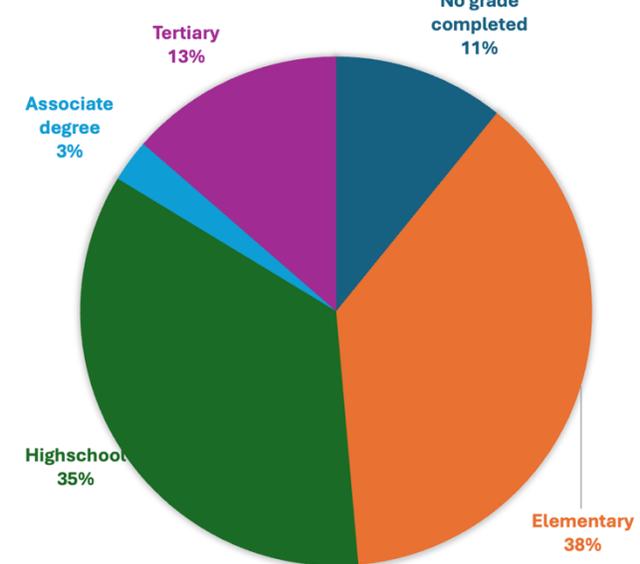
DISTRIBUTION OF VULNERABLE GROUPS BY AGE (2021)



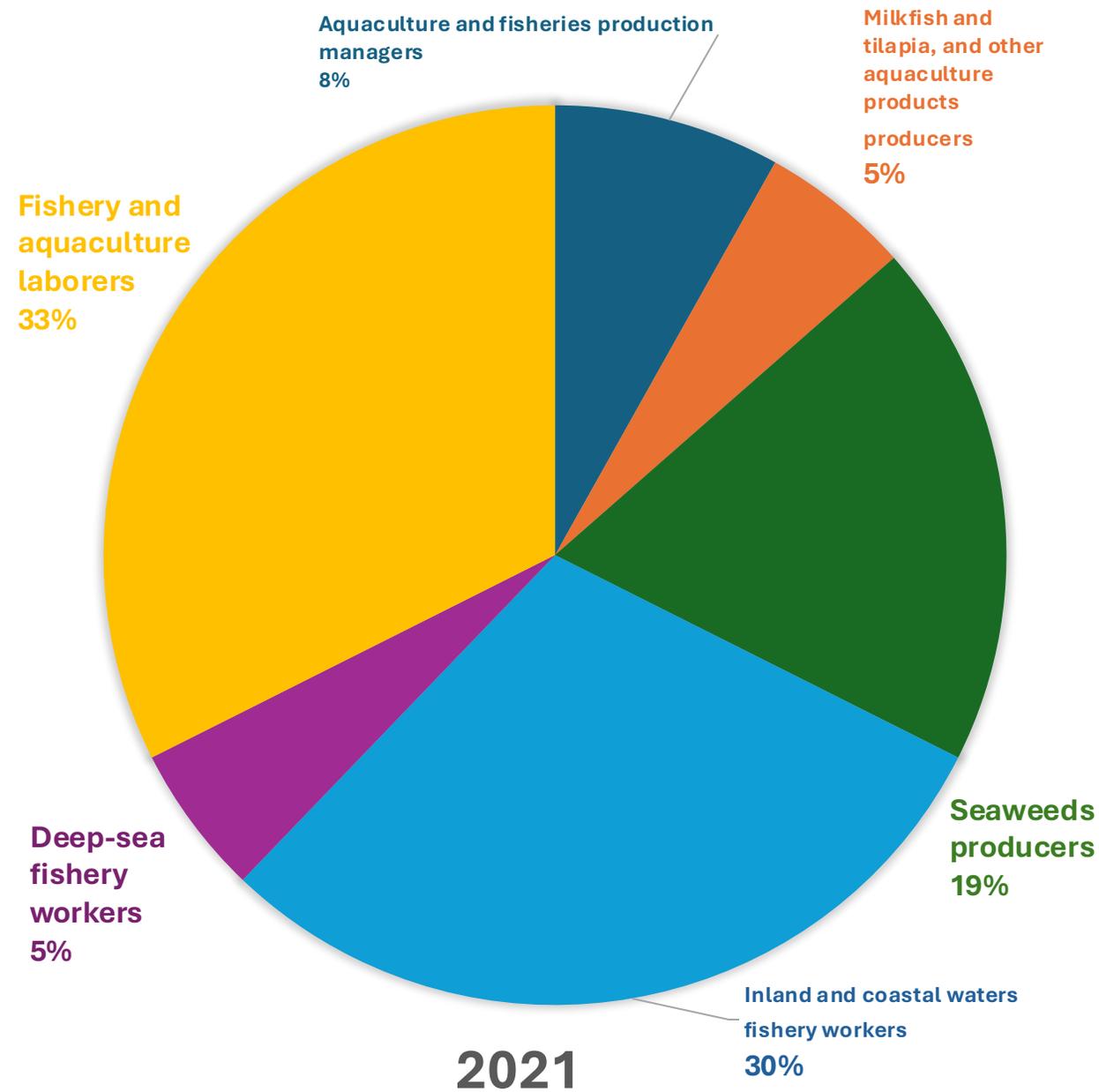
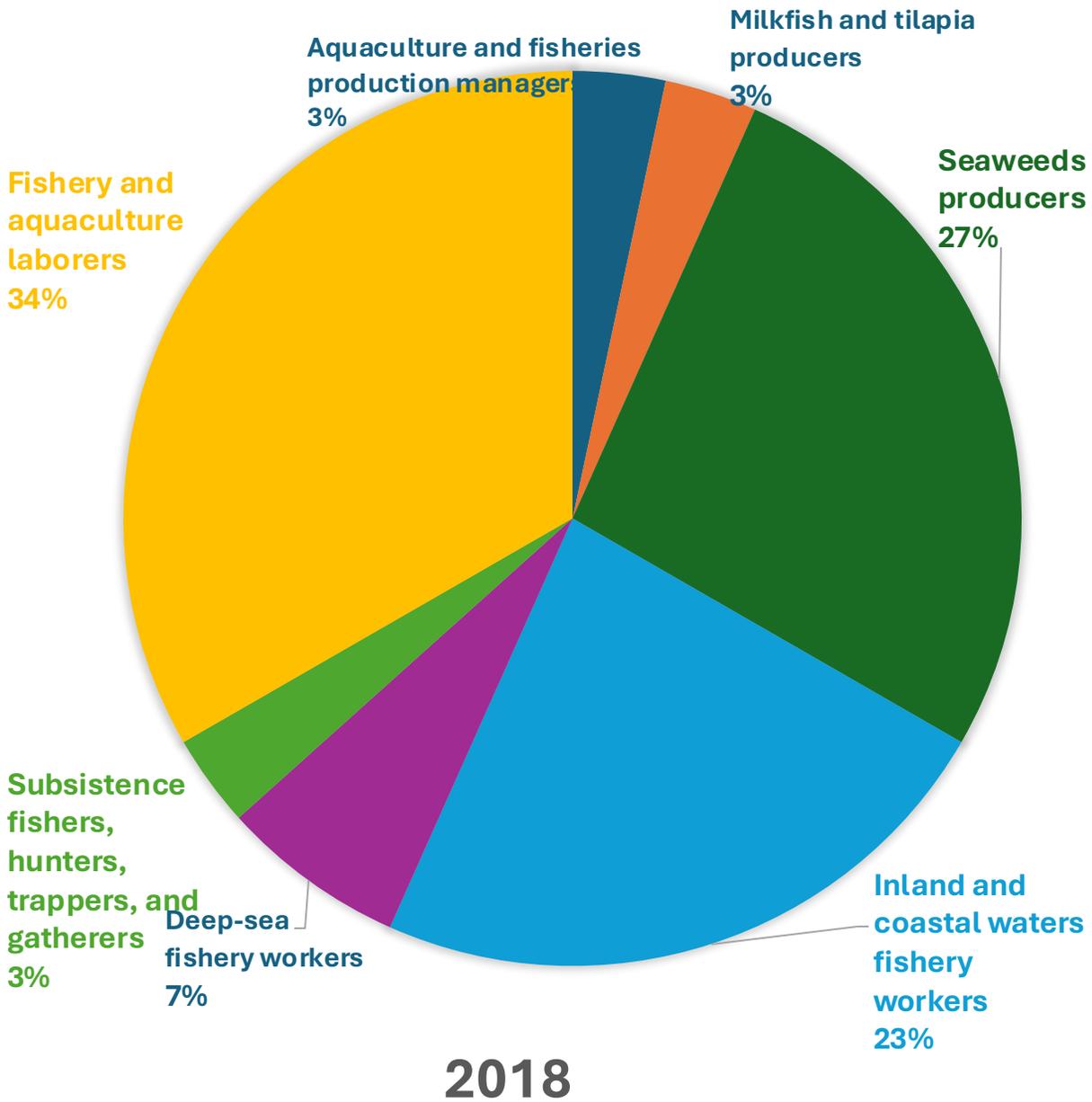
DISTRIBUTION OF VULNERABLE GROUPS BY EDUCATIONAL ATTAINMENT (2018)



DISTRIBUTION OF VULNERABLE GROUPS BY EDUCATIONAL ATTAINMENT (2018)



# DISTRIBUTION OF VULNERABLE GROUPS BY TYPE OF FISHERIES/AQUACULTURE WORK



# Conclusion and Policy Implications

- This study leverages national household data (FIES-LFS) to analyze the characteristics and vulnerability to poverty of female-headed fishing households in the Philippines.
- Female-headed fishing households remain the most vulnerable to poverty compared to male-headed households, despite some improvement between 2018 and 2021.
- While poor households are most at risk, about 30% of non-poor households are also vulnerable, highlighting the need to include them also in policy interventions.
- Vulnerability is highest among those with household head aged 40–59 and those with only elementary education.
- Households engaged in low-skilled fisheries and aquaculture labor face the greatest risk.

# Conclusion and Policy Implications

- Results of this study sheds light to policymakers in identifying at-risk groups early, allocate resources more effectively, and design interventions that prevent future poverty rather than merely responding to it.
- E.g. provide equal attention to other vulnerable groups in fisheries and aquaculture such as laborers and crew members alongside fishers and boat owners in interventions.
- Implement a data system to capture detailed information on women's roles and contributions in fisheries households, tracking participation, economic input, access to services, and representation in decision-making.
- Future research should consider sector specific data and explore intersectionality analysis to understand how gender, age, education, and type of fisheries work jointly shape vulnerability.
- Limitation: Small sample size of female-headed fishing households due to reliance on FIES-LFS data hence the lack of sector-specific variables.



# Thank you!