WHAT PREMIUMSARE LIVESTOCK FARMERS WILLING TO PAY FOR INDEMNITY INSURANCE IN FOUR DIVISIONS OF THE WEST REGION, CAMEROON?

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ABSTRACT

Poultry and pig farmers in the West Region of Cameroon inherently face risks. However, no insurance company offers indemnity insurance to cover these risks. This study investigatesthe premiumspoultry and pig farmers are willing to pay for insurance and the determinants of thesepremiums. A quantitative design was employed, involving a sample of 484 poultry and pig farmers selected through cluster and snowball sampling techniques from the Mifi, Koung-Khi, Bamboutos, and Upper-Plateau Divisions. Primary data were collected using structured questionnaires (of which 430 questionnaires were retrieved), and quantitative analyses were conducted using the Chi-Square, Logistic Regression, and Integrated Value Mapping Test. This study revealed that most farmers(40.7%) were willing to pay $79 (50,000CFA) for indemnity insurance. For poultry farmers, household and flock sizewere significant determinants. Production factors influenced the premiumsthey were willing to pay for insurance than socioeconomic factors, with a predictive power/explanatory power (PP/EP) of 33.9% and 9.5%, respectively. The Integrated Value Mapping (IVM) combining the predictive effects of both components was 38%, implying that with 62% variability not explained, there are other factors to reckon with.For pig farmers, years of farming experience, annual farming income, division, household and flock sizewere significant determinants of thepremiumsfarmers werewilling to pay for insurance. Socioeconomic factors predicted willingness to subscribe to insurance almost at the same degree as production factors, with a predictive power/explanatory (PP/EP) of 61.6% and 62.4%, respectively. The Integrated Value Mapping (IVM) combining the predictive effects of both components was 74.3%, thus implying that with 25.7% variability not explained as there are other factors to reckon with.This study recommends that the government and development partners should establish premium-subsidisedindemnity insurance initiatives, especially for small-scale farmers.

Keywords: *Determinants, Insurance, Livestock, Poultry, Premium, Pig and Willingness*

1. INTRODUCTION

The pig and poultry sectors are strategic in Cameroon's economy as theycontribute to food security, poverty alleviation and economic growth. There are over 3,000,000 pigs and about 72,000,000 poultry birds in Cameroon (Ministry of Livestock, Fisheries and Animal Industries and Livestock Sector Improvement and Development Project (MINEPIA / PADFEL, 2015) cited in Platform for Agricultural Risk Management (PARM, 2017)). In 2012, meat production amounted to more than 230,000 tons, of which 38.7 % was poultry meat, and 8.2% was pork (Ministry of Economy, Planning and Regional Development/ Rural Sector Development Strategy (MINEPAT / SDSR) 2016 cited in PARM, 2017). The total number of controlled chickens was 72,758,691 in 2013 (68.9% broilers, 25.6% traditional chickens, and 5.5%

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laying hens). Controlled egg production was 65,116 tons in 2013. According to the Poultry Interprofessional of Cameroon (French acronym IPAVIC) (2016), there are 9,000 poultry farms and the sector employs about320,000 persons. Furthermore, poultry farmers annually produced 46.43 million broilers and 119,340 tons of table eggs. With a national consumption of 3.48 kilograms of chicken/person/year, national production needs to be strengthened for chicken consumption/person/year to attain the average world consumption of13.6 kg per person (Viban and Mfondo, 2021).

Domestic production is concentrated mainly in the country's West Region, even though the Littoral, Center, and North-West Regions contribute significantly to poultry and pork meat production (PARM, 2017).The West Region is the largest pig production region, with a herd estimated at 3,500,000 heads, providing 4/5 of pigs commercialised in the country (MINEPIA, 2011).

The government, non-profit organisations, and the private sector of Cameroon consider poultry farming as a way out of youth unemployment and poverty alleviation. For this reason, the government implemented programs to promote poultry and pig farming (among other entrepreneurial initiatives). Some of these programs include the Rural and Urban Youth Support Program (PAJER-U), Integrated Support Project for Actors in the Informal Sector (PIAASI), and Youth Agropastoral Entrepreneurship Promotion Program (PEA-Jeunes). Furthermore, low public-sector salaries, underemployment, and unemployment have pushed many Cameroonians into poultry and pig farming. However, the resilience of these farmers remains low in the face of several risks, notably the African Swine Fever and Avian Flu.

Smallholder and poor farmers are vulnerable due to inadequateresources to take preventive measures or absorb shocks (Syroka and Wilcox, 2006). There is still aconsiderable protection gap, with many farmers ill-prepared to withstand losses in an epidemic (Urech, 2017). Livestock farming insurance (LFI) seems to be a risk management tool that can help Cameroon bridge the protection gap, strengthen the resilience of farmers, and chart a sustainable development path for the livestock sector.

No insurance company in Cameroon and the West Region offers indemnity insurance. Notwithstanding, most poultry and pig farmers (51.2%, 220) were unwilling to get LFI, because they did not know the importance of LFI, they were smallholder farmers who preferred other strategies to manage risk than LFI, because LFI can be expensive. Only 33.5% (144) were willing to get LFI, with a greater proportion of poultry farmers (39.0%, 90) willing to get LFI than pig farmers (27.1%, 54). This is because they understood the power of LFI to enhance their livestock production. Farmers in the Mifi Division were more willing to pay for LFI than those in the Bamboutos, Upper-Plateau and Koung-Khi Divisions. The influence of production factors was more pronounced for poultry farmers, while socioeconomic characteristics had a more significant impact on pig farmers' willingness to subscribe to LFI (Emmanuel, Humphrey and Louis-Bernard, 2024).

Despite information on poultry and pig farmers' willingness to get LFI, no information is known about the premiumspoultry and pig farmersare willing to pay for livestock farming insurance (LFI) and the determinants of these premiums.This study investigates the premiums that poultry and pig farmers are willing to pay for livestock farming insurance and the determinants of these premiums in the Mifi, Koung-Khi, Bamboutos and Upper-Plateau Divisions of the West Region of Cameroon. This information is to be considered in the design of insurance premium subsidies for poultry and poultry farmers.

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2. MATERIALS AND METHODS

2.1 Study Area

This study was conducted in the Mifi (5° 28′ 45″ N, 10° 25′ 11″ E), Koung-Khi (5° 22′ 29″ N, 10° 24′ 43″ E), Bamboutos (5° 37′ 34″ N, 10° 15′ 17″ E) and UpperPlateau (5° 20′ 05″ N, 10° 22′ 06″ E) Divisions of the West Region of Cameroon as shown in Figure 1.

The Mifi and Koung-Khi Divisions were the leading poultry production and the Bamboutous and Upper Plateau Divisions were the leading pig production areas (MINEPIA, 2019).Between 2014 and 2019, pig farmers raised 854,232 pigs in the West Region. Between 2014 and 2019, pork production in the Bamboutos and Upper Plateau Divisions was 507.38 tons, and that of the West Region was 3,400 tons. From 2014-2019, 41,639,496 chickens were grown in the West Region. Poultry farmers produced 16,887.9 tons of poultry meat from 2014 to 2019. In the Mifi and Koung-Khi Divisions (area of focus for poultry farming), 1,116.3 tons were produced from 2014 to 2019, making up 6.6% of total poultry meat production in the West Region. In the West Region, poultry farmers produced 4,542,167,237 eggs between 2014 and 2019 (MINEPIA, 2016, 2017, 2018, 2019).

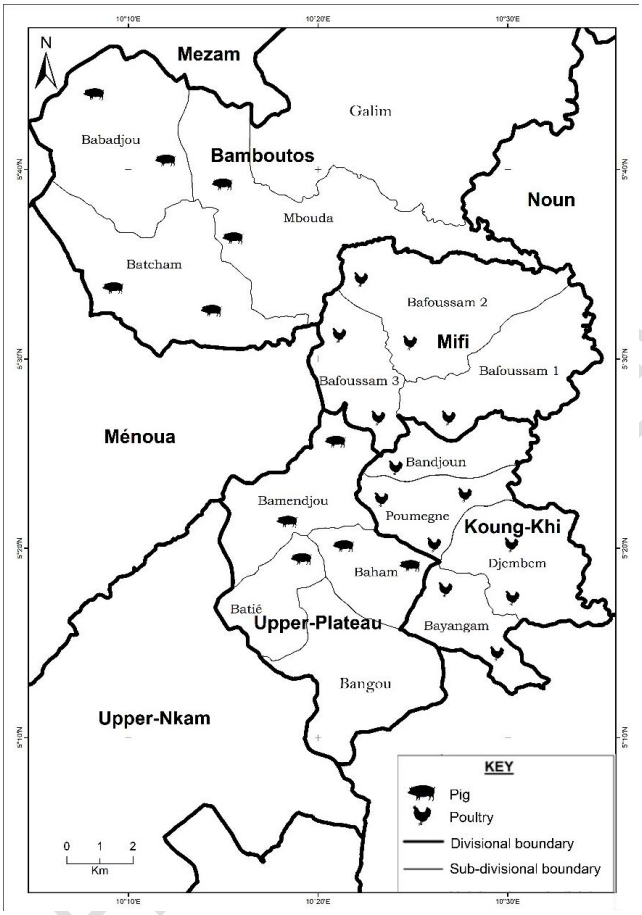

Fig 1. Map of the West Region of Cameroon, showing case study divisions

National Institute of Cartography (2020) and Fieldwork (2020)

NB: The symbols on the map illustrate the leading poultry and pig production areas and do not represent the number of chickens and pigs per surface area.

2.2 Research Design and Sample Size Determination

This study employed a quantitative research design. Due to the absence of reliable data on the number of poultry and pig farmers per division, the sample size was estimated based on the total number of households involved in livestock farming on the one handand the pig and poultry productivity in the West Region on the other. The calculated sample size was 422 poultry and pig farmers but was increased by 10 per cent to 484 farmers to ensure that the questionnaire return rate was not less than 80%.

2.3 Data Collection Procedure

The data collection process involved administering 484 structured questionnaires using a two-stage sampling technique. The cluster sampling technique was initially employed to identify the four primary divisions in which farmers were engaged in poultry farming (Mifi and Koung-Khi Divisions) or pig farming (Bamboutos and Upper Plateau Divisions). Subsequently, an equal number of questionnaires were distributed in each case study division, and they were administered to poultry and pig farmers using a snowball sampling technique.Of the 484 questionnaires distributed, 430 were returned, resulting in a success rate of 89%.

2.4 Data Analysis

The data analysis involved several statistical techniques to examine the relationship between poultry and pig farmers' socioeconomic and production characteristics and the premiums they were willing to pay for livestock farming insurance. The Chi-Square Test assessed the association between these factors and the premiums that farmers were willing to pay for indemnity insurance. Additionally, a Binary Logistic Regression Model was employed to evaluate the predictive effects of socioeconomic and production factors on the premiums that farmers are willing to pay for livestock insurance.To further investigate the significant factors influencing the amounts that farmers are willing to pay for livestock farming insurance (LFI), an Integrated Value Mapping (IVM) analysis was conducted. The IVM analysis aimed to identify whether socioeconomic or production factors played a more prominent role in influencing the premiums farmers are willing to pay for LFI. By integrating the predictive effects of both components, the IVM analysis provided insights into the relative contribution of each category (socioeconomic or production factors) in shaping the premiums farmers are willing to pay for LFI.

3. RESULTS AND DISCUSSION

3.1. Premiumspoultry and pig farmers are willing to pay for LFI

The premium that poultry and pig farmers are willing to pay for LFI per yearindicates the degree of sensitisation that has to be done regarding LFI and the premium subsidies that can be designed for LFI. This information lets insurance companies easily anticipate participation rates and adjust their insurance schemes. The amount farmers were willing to pay for LFI ranged from less than 50,000FCFA to 700,000FCFA, as shown in Table 1.

Table 1: Premiums (CFA)poultry and pig farmers are willing to pay per year for LFI

Livestock category	stats	≤50,000	50,001-100,000	100,001-300,000	300,001-500,000	500,001-700,000	Undecided
Poultry	n	90	79	28	5	1	28
	%	20.9%	18.4%	6.5%	1.2%	0.2%	6.5%
Pig	n	85	57	27	6	0	24
	%	19.8%	13.3%	6.3%	1.4%	0.0%	5.6%
Total	**n**	**175**	**136**	**55**	**11**	**1**	**52**
	%	**40.7%**	**31.6%**	**12.8%**	**2.6%**	**0.2%**	**12.1%**

Source: Fieldwork (2020)

It was realised that the higher the insurance premiums, the fewer farmers willing to pay for LFI. Most farmers (40.7%, 175) were willing to pay 50.000FCFA or less annually to cover the

risks in their livestock farms. The percentage of poultry farmers (20.9%) was almost the same as that of pig farmers (19.8%). Furthermore, 31.6%(136) were willing to pay between 50.001 and 100.000CFA to get LFI coverage. Moreover, 12.8% (55) were willing to pay 100,001-300,000FCFA for LFI. More poultry farmers (6.5%, 28) were willing to pay higher than pig farmers (6.3%, 27).The majority of farmers in the West Region are smallholders who have family production units and do not earn a significantly high income from farming, which is the reason for the low premiums they are willing to pay for LFI. Those with considerably larger units who understood the importance of LFI were willing to pay higher.

Table 2 shows the distribution of premiums that poultry and pig farmers were willing to pay in the Mifi, Koung Khi, Upper Plateau and Bamboutos Divisions.

Table 2. Premiums that poultry and pig farmers are willing to pay in the Mifi, Koung Khi, Upper Plateau and Bamboutos Divisions.

Division	Stat	≤50,000	50,001-100,000	100,001-300,000	300,001-500,000	500,001-700,000	Undecided
Mifi	n	73	60	17	4	1	10
	%	17.0	14.0	4.0	0.9	0.2	2.3
Koung Khi	n	17	19	11	1	0	18
	%	4.0	4.4	2.6	0.2	0.0	4.2
Bamboutos	n	60	34	12	1	0	9
	%	14.0	7.9	2.8	0.2	0.0	2.1
Upper Plateau	n	25	23	15	5	0	15
	%	5.8	5.3	3.5	1.2	0.0	3.5
Total	n	**175**	**136**	**55**	**11**	**1**	**52**
	%	**40.7**	**31.6**	**12.8**	**2.6**	**0.2**	**12.1**

Fieldwork (2020)

Most farmers in the Mifi Division (17.0%, 73) were willing to pay less than 50,000CFA for LFI. This was followed by farmers in the Bamboutos (14.0%, 60). Furthermore, farmers in their majority in the Mifi Division (14.0%,60) were willing to pay 50,001-100,000CFA, followed by farmers in the Bamboutos (7.9%, 34). For farmers willing to pay 100,001-300,000CFA, farmers in the Mifi (4.0%, 17) and Upper Plateau Divisions (3.5%, 15) were willing to pay a higher premium for LFI. Most farmers in the Upper-Plateau Division (1.2%, 5) and 0.9 (4) in the Mifi Division were willing to pay 300,001-500,000CFA for LFI. Only 0.2% (1) of farmers in the Mifi Division were willing to pay 500,001-700,000CFA. Furthermore, the majority of farmers 4.2% (18) in the Koung Khi Division, followed by 3.5% (15) of farmers in the Upper Plateau, 2.3% (10) in the Mifi and 2.1% (15) in the Bamboutos Divisions were undecided on the premium they are willing to pay.

3.2. Determinants of the premiumpoultry and pig farmersare willing to pay for LFI

3.2.1.Poultry farmers' socioeconomic factors and premium amount willing to pay for LFI

The association between poultry farmers' socioeconomic characteristics and the amount willing to pay to get livestock insurance is shown in Table 3, and Wald Statistics of Binary Logistic Regression depicting the predictive effect of socioeconomic factors controlled for each other on the premium willing to pay for a livestock insurance scheme is shown in Table 4.

Table 3: Association between socioeconomic characteristics of poultry farmers and the premium willing to pay for LFI

Determinants	Categories	Premiums farmers are willing to pay for LFI		n	χ2-test (df=0.05)
		≤50000	>50000		
Gender	Male	55.4% (62)	44.6% (50)	112	χ2=0.403 P=0.526
	Female	46.7% (7)	53.3% (8)	15	
Age	18-37	70.4% (19)	29.6% (8)	27	χ2=4.302 P=0.231
	38-47	44.7% (17)	55.3% (21)	38	
	48-57	54.0% (27)	46.0% (23)	50	
	58+	50.0% (6)	50.0% (6)	12	
Household size	1-2	67.3% (33)	32.7% (16)	49	χ2=13.510 P=0.001
	3-4	54.0% (34)	46.0% (29)	63	
	5+	13.3% (2)	86.7% (13)	15	
Years of experience	1-5	80.0% (12)	20.0% (3)	15	χ2=5.169 P=0.270
	6-10	51.4% (18)	48.6% (17)	35	
	11-15	55.3% (21)	44.7% (17)	38	
	16-20	46.4% (13)	53.6% (15)	28	
	21+	45.5% (5)	54.5% (6)	11	
Highest level of school attained	Never been to school and primary	56.8% (25)	43.2% (19)	44	χ2=0.229 P=0.892
	Secondary	53.6% (37)	46.4% (32)	69	
	High school, vocational training and university education	50.0% (7)	50.0% (7)	14	
Main occupation	Poultry farm	57.3% (63)	42.7% (47)	110	χ2=5.018 P=0.285
	Crop Farmer	27.3% (3)	72.7% (8)	11	
	Casual labourer	100% (1)	0.0% (0)	1	
	Employee	33.3% (1)	66.7% (2)	3	
	Businessperson	50.0% (1)	50.0% (1)	2	
Marital status	Single	54.3% (19)	45.7% (16)	35	χ2=1.629 P=0.443
	Married	56.8% (46)	43.2% (35)	81	
	Widowed	36.4% (4)	63.6% (7)	11	
Annual poultry income	< 1 million	50.0% (3)	50.0% (3)	6	χ2=0.036 P=0.849
	1 million +	54.0% (61)	46.0% (52)	113	
Monthly household income	<500000	45.5% (5)	54.5% (6)	11	χ2=3.081 P=0.214
	500000-1499000	85.7% (6)	14.3% (1)	7	
	1500000+	54.5% (55)	45.5% (46)	101	

Source: Fieldwork (2020)

The amount poultry farmers were willing to pay for LFI was significantly associated only with household size. The higher the household size, the higher the amount they were willing to pay for LFI (P=0.000). Many families depend on poultry farming because it is their main economic activity. Poultry farmerswill pay a significant amount to avoid significant periods of business interruption due to livestock losses.

The influence of the significant determinants highlighted above was appraised while controlling for each other to silence the confounders using the Wald test of Logistic Regression.

Table 4: Wald Statistics of Binary Logistic Regression depicting the predictive effect of socioeconomic factors on the premium that poultry farmersare willingto pay for LFI

Determinants	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Household size	.148	.269	18.259	1	.000	3.150	1.861	5.333

Source: Fieldwork (2020)

Wald Statistics highlighted household size as a significant and critical determinant (OR >1; LB>1).

3.2.2. Poultry farmers' production factors and premium willing to pay for LFI

The association between poultry farmers' production characteristics and the amount willing to pay to get LFI is shown in Table 5, and Wald Statistics of Binary Logistic Regression depicting the predictive effect of production factors controlled for each other on the amount willing to pay to get a livestock insurance scheme is shown in Table 6.

Table 5: Association between poultry farmers' production characteristics and amount willing to pay for LFI

Determinants	Categories	Premiums farmers are willing to pay for LFI		n	χ2-test (df=0.05)
		≤50000	>50000		
Evaluation of risk management strategies	Adequate	53.5% (61)	46.5% (53)	114	χ2=1.010 P=0.315
	Inadequate	70.0% (7)	30.0% (3)	10	
Source of labour	Family	56.7% (59)	43.3% (45)	104	χ2=3.565 P=0.168
	Employees	27.3% (3)	72.7% (8)	11	
	Both	58.3% (7)	41.7% (5)	12	
Number of farm	One	63.6% (42)	36.4% (24)	66	χ2=4.809 P=0.028
	More than one	44.1% (26)	55.9% (33)	59	
Total size of flock	<=5000	68.2% (45)	31.8% (21)	66	χ2=10.217 P=0.001
	>5000	39.3% (22)	60.7% (34)	56	
Division	Mifi	55.8% (67)	44.2% (53)	120	χ2=1.168 P=0.280
	Koung-khi	33.3% (2)	66.7% (4)	6	
Setting type	Peri-urban	66.7% (60)	33.3% (30)	90	χ2=18.946 P=0.000
	Rural	24.3% (9)	75.7% (28)	37	
Type of animal kept	Local chicken	55.5% (65)	44.5% (52)	117	χ2=0.906 P=0.636
	Broilers	40.0% (4)	60.0% (6)	10	
Source of capital	Personal savings	67.6% (25)	32.4% (12)	37	χ2=3.342 P=0.188
	Personal savings and loan	49.3% (37)	50.7% (38)	75	
	Loan only	53.8% (7)	46.2% (6)	13	

Source: Fieldwork (2020)

Amount willing to pay for a livestock insurance scheme was significantly associated with the following determinants:

- **Number of farms**: Those with more than one farm were more willing to pay higher (P=0.028) than those with one farm.Farmers with many farms have more income than farmers with just one farm and can draw resources from other farms to cover their strategic farms. Furthermore, the losses in this case will be more significant for farmers with several farms than those with one.
- **Total size of the flock**. Farmers with a flock size greater than 5,000 chickens were more willing to pay higher (P=0.001). This is because of the significant level of investment made in these farms.
- **Setting type**: Farmers in rural settings were willing to pay more than farmers in peri-urban areas (P=0.000).Large poultry farms are often located in rural areas due to space requirements. Poultry farmers with large farms have invested lots of money and will not want to lose it due to risk factors. They prefer to pay a significant premium to transfer risk to insurance companies.

The influence of the significant determinants highlighted above was appraised while controlling for each other to silence the confounders using the Wald test of Logistic Regression.

Table 6: Wald statistics of Binary Logistic Regression depicting the predictive effect of poultry farmers' production factors and the premium they are willing to pay for LFI

Determinants	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Number of farms	-.042	.514	.007	1	.935	.959	.350	2.628
Total size of flock	1.203	.514	5.476	1	.019	3.330	1.216	9.123
Setting type	.177	.136	1.681	1	.195	1.193	.914	1.558

Source: Fieldwork (2020)

After controlling determinants for each other, Wald Statistics highlighted only the total size of the flock as a significant and critical predictor (OR >1; LB>1).

3.2.3. **Model summary (poultry farmers)**

The model summary for socioeconomic and production factors was computed using the Integrated Value Mapping (IVM) approach, as shown in Table 7.

Table 7: Model summary of the influence of socioeconomic and production factors on the premium poultry farmers are willing to pay for LFI

Predictive component	Omnibus Tests of Model Coefficients	Predictive Power / Explanatory Power (Nagelkerke R Square)
Socioeconomic factors	P=0.477	9.5%
Production factors	P=0.000	33.9%
IVM	P=0.010	38.0%

Source: Fieldwork (2020)

Production factors predicted the premium poultry farmers are willing to pay for LFI more than socioeconomic factors, with predictive power/explanatory power (PP/EP) of 33.9% and

9.5%, respectively. The Integrated Value Mapping (IVM) combining the predictive effects of both components was 38.0%, thus implying that with 62.0% variability not explained, there are other factors to reckon with.

3.2.4. Pig farmers' socioeconomic factors and premium amount willing to pay for LFI

The association between pig farmers' socioeconomic characteristics and the amount willing to pay to get livestock insurance is shown in Table 8. The premium pig farmers are willing to pay for LFI was significantly associated with the following variables:

Table 8: Association between socioeconomic characteristics of pig farmers and the amount willing to pay for a livestock insurance scheme

Determinants	Categories	Premiums farmers are willing to pay for LFI		n	χ2-test (df=0.05)
		≤50000	>50000		
Sex	Male	51.7% (89)	48.3% (83)	172	χ2=5.105 P=0.024
	Female	78.9% (15)	21.1% (4)	19	
Age	18-37	77.8% (49)	22.2% (14)	63	χ2=31.756 P=0.000
	38-47	53.8% (35)	46.2% (30)	65	
	48-57	37.7% (20)	62.3% (33)	53	
	58+	0.0% (0)	100% (10)	10	
Household size	1-2	80.6% (87)	19.4% (21)	108	χ2=69.582 P=0.000
	3-4	22.4% (17)	77.6% (59)	76	
	5+	0.0% (0)	100% (7)	7	
Years of experience	1-5	79.7% (51)	20.3% (13)	64	χ2=40.408 P=0.000
	6-10	61.1% (33)	38.9% (21)	54	
	11-15	33.3% (13)	66.7% (26)	39	
	16-20	23.1% (6)	76.9% (20)	26	
	21+	12.5% (1)	87.5% (7)	8	
Highest level of school attained	Never been to school, and primary	51.2% (43)	48.8% (41)	84	χ2=0.644 P=0.881
	Secondary	56.4% (57)	43.6% (44)	101	
	High school, vocational training and university education	66.7% (4)	33.3% (2)	6	
Main occupation	Pig farming only	54.2% (58)	45.8% (49)	107	χ2=12.182 P=0.016
	Crop and livestock farmers	70.4% (19)	29.6% (8)	27	
	Casual labourers	75.0% (12)	25.0% (4)	16	
	Employees	44.0% (11)	56.0% (14)	25	
	Businessperson	25.0% (4)	75.0% (12)	16	
Marital status	Single	67.6% (50)	32.4% (24)	74	χ2=8.368 P=0.015
	Married	45.6% (47)	54.4% (56)	103	
	Widowed	53.8% (7)	46.2% (6)	13	
Annual farming income (FCFA)	< 1 million	85.0% (85)	15.0% (15)	100	χ2=78.981 P=0.000
	1 million +	20.9% (19)	79.1% (72)	91	
Monthly household	<500000	57.0% (102)	43.0% (77)	179	χ2=7.370 P=0.007

income (FCFA)	500000 +	16.7% (2)	83.3% (10)	12	

Source: Fieldwork (2020)

- **Sex**: Males were willing to pay higher than females (0.024) because they were the primary decision-makers and managers. Furthermore, men are more inclined to engage in actions that protect their families and investments.
- **Age**: The older the farmer, the higher the amount they were willing to pay for LFI (P=0.000) because they have gained wisdom to know that the combination of risk transfer, mitigation and coping strategies are essential for an optimum protection of their farms.
- **Household size**: The higher it was, the higher the amount farmers were willing to pay for LFI (P=0.000).
- **Years of work experience**: The higher it was, the higher the amount farmers were willing to pay for LFI (P=0.000).Older farmers and those with higher experience were willing to pay higher amounts because they better understood the risks they faced and their impact. Thus, they would pay significant money to transfer their risks to insurance companies.
- **Main occupation**: Businesspersons were willing to pay the highest, followed by employees (P=0.016), because they have income from other activities to invest in pig farming.These categories of people do not put all their energy into managing their farms because they are engaged in other activities. Given that they have extra income from another activity, they were willing to pay a significant amount to transfer their risks to insurance companies and make up for a potential failure in their management practices.
- **Marital status**: Married farmers were willing to pay the highest for LFI (P=0.015) because their families greatly depend on this economic activity.
- **Annual farming income**: The higher the income from pig farming, the higher the amount farmers are willing to pay for LFI (P=0.000), the same with monthly household income (P=0.007).High-income farmers had more discretionary income to pay significant amounts for LFI. Furthermore, they will not want to lose their current socioeconomic status associated with their income from LFI.

The Wald Statistics of Binary Logistic Regression depicting the predictive effect of demographic factors controlled for each other on the amount willing to pay for LFI is shown in Table 9. The influence of the significant determinants highlighted above was appraised while controlling for each other to silence the confounders using the Wald test of Logistic Regression.

Table 9: Wald statistics of Binary Logistic Regression depicting the predictive effect of pig farmers' demographic factors

Determinants	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Gender	-.348	.737	.223	1	.637	.706	.167	2.995
Age	.465	.326	2.036	1	.154	1.593	.840	3.018

Household size	1.827	.466	15.395	1	.000	6.213	2.495	15.474
Years of experience	.416	.225	3.405	1	.045	1.516	1.004	2.357
Main occupation	.069	.181	.146	1	.702	1.072	.751	1.528
Marital status	-.112	.447	.062	1	.803	.894	.372	2.149
Annual farming income	1.746	.453	14.849	1	.000	5.731	2.358	13.927
Monthly household income	.872	1.341	.423	1	.516	2.392	.173	33.158

Source: Fieldwork (2020)

After controlling determinants for each other, Wald Statistics highlighted three significant determinants (years of farming experience, household size and annual farming income). Beyond this, they were all critical determinants (OR >1; LB>1).

3.2.5. Pig farmers' production factors and amount willing to pay for LFI

The association between the production characteristics of pig farmers and the amount willing to pay to get livestock insurance is shown in Table 10.

Table 10: Association between production factors for pig farmers and premium willing to pay for a livestock insurance scheme

Determinants	Categories	Premiums farmers are willing to pay for LFI		n	χ2-test (df=0.05)
		≤50000	≥50000		
Evaluation of risk management strategies	Adequate	50.0% (66)	50.0% (66)	12	χ2=2.860 P=0.091
	Inadequate	64.0% (32)	36.0% (18)	50	
Source of labour	Family	81.1% (86)	18.9% (20)	106	χ2=70.896 P=0.000
	Employees	0.0% (0)	100% (12)	12	
	Both	24.7% (18)	75.3% (55)	73	
Number of farms	One	57.0% (102)	43.0% (77)	179	χ2=7.370 P=0.007
	More than one	16.7% (2)	83.3% (10)	12	
Total size of flock	<=30	63.8% (104)	36.2% (59)	163	χ2=39.221 P=0.000
	>30	0.0% (0)	100% (28)	28	
Division	Bamboutos	55.1% (54)	44.9% (44)	98	χ2=17.919 P=0.000
	Upper Plateau	39.1% (25)	60.9% (39)	64	
Setting type	Peri-urban	55.2% (37)	44.8% (30)	67	χ2=0.025 P=0.875
	Rural	54.0% (67)	46.0% (57)	124	
Type of animal kept	Local species	70.0% (14)	30.0% (6)	20	χ2=3.333 P=0.189
	Exotic species	48.0% (36)	52.0% (39)	75	
	Crossed species	56.3% (54)	43.8% (42)	96	
Source of capital	Personal savings	63.3% (50)	36.7% (29)	79	χ2=12.853 P=0.002
	Personal savings and loan	68.3% (28)	31.7% (13)	41	
	Loan only	38.2% (26)	61.8% (42)	68	

Source: Fieldwork (2020)

Premium that pig farmers are willing to pay for a LFI was significantly associated with the following determinants:

- **Source of labour**: Farmers who used family labour were willing to pay lower (P=0.000).Those who employed family labour on their farms were willing to pay less, while those who used employees were willing to pay higher (P=0.000). Family labour can easily be controlled and will be more faithful in carrying out their duties than employees. Employees might be more careless than family members because they do not own the business.
- **Number of farms**: Farmers with more than one farm were willing to pay higher (P=0.007).
- **Flock size**: Those with more than 30 pigs were willing to pay higher (P=0.000).
- **Division**: Farmers in the Upper Plateau Division were mainly willing to pay higher (P=0.000) because most farmers had bigger farms.
- **Source of capital**: Those who took loans only were willing to pay higher (P=0.002)to not default on the payment of their loans due to business interruptions linked to several risk factors.

The Wald statistics of Binary Logistic Regression depicting the predictive effect of production factors controlled for each other on the amount willing to pay to get a livestock insurance scheme is shown in Table 11. The influence of the significant determinants highlighted above was appraised while controlling for each other to silence the confounders using the Wald test of Logistic Regression.

Table 11: Wald Statistics of Binary Logistic Regression depicting the predictive effect of pig farmers' production factors

Determinants	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Source of labour	.361	.283	1.621	1	.203	1.434	.823	2.500
Number of farms	1.519	1.060	2.052	1	.152	4.568	.572	36.506
Total size of flock	3.317	.604	30.187	1	.000	27.573	8.445	90.020
Division	.628	.192	10.697	1	.001	1.873	1.286	2.729
Source of capital	-.613	.376	2.660	1	.103	.542	.260	1.132

Source: Fieldwork (2020)

After controlling determinants for each other, Wald Statistics highlighted the total size of flock and division as significant determinants of the amount willing to pay for a livestock insurance scheme. Beyond this, two of them were critical predictors (OR >1; LB>1).

3.2.6. Model summary (pig farmers)

The model summary for socioeconomic and production factors was computed using the Integrated Value Mapping (IVM) approach, as shown in Table 12.

Table 12: Model summary for pig farmers, outcome variable (premium willing to pay for LFI)

Predictive component	Omnibus Tests of Model Coefficients	Predictive Power / Explanatory Power (Nagelkerke R Square)
Demographic factors	P=0.000	61.6%
Production factors	P=0.012	62.4%
IVM	P=0.000	74.3%

Source: Fieldwork (2020)

Socioeconomic factors predicted willingness to subscribe to a livestock insurance scheme almost at the same level as production factors, with a predictive power/explanatory (PP/EP) of 61.6% and 62.4%, respectively. The Integrated Value Mapping (IVM) combining the predictive effects of both components was 74.3%, thus implying that with 25.7% variability not explained, there are other factors to reckon with.

3.3. Discussion

This study revealed that farmers were willing to pay a low premium (less than $79 (50,000CFA) as a premium per year to cover the risks faced in their livestock farms. This finding is in line with a study conducted by Aina, Ayinde, Thiam, Muchandondwa and Miranda (2018) in which Nigerian farmers were willing to pay index LFI premiums at $26.11 (N23,500) per year for a livestock value of $555 (N500,000) in livestock value.Oduniyi, Antwi, Tekana (2020) realized that few farmers were willing to pay insurance premiums at most $42 (R600) as LFI is a new concept. According to Amelia, Mashyuri and Suryantini (2021), cattle farmers who did not participate in LFI were willing to pay $1.5 (22,600 IDR), while those who participated were willing to pay higher $2.34 (36,320 IDR).Mame M (2021) realized that 50% of farmers were willing to pay at least 3000 CFA (6 USD) to get farming insurance, in spite of the type of animals reared and the type of insurance cover that the insurance company proposed to them. According to Osman (2020), most farmers were willing to pay significant amounts for total insurance coverage, and the willingness to pay declines when coverage is 80%, while other farmers are unwilling to pay when insurance coverage is below 70%. Furthermore, Pengfei, Lingling, Dongqing, Shi and Yueying (2021) realised that more people were willing to get insurance when premium prices decreased. Moreover, Suharyanto and Zikril (2021) noticed that farmers were willing to pay lower premiums than the premiums paid at that time as they wanted more subsidies from the government.According to Jules, Fabrice and Joseph (2022), education and farm size are significant determinants of the premium farmers are willing to pay for insurance. Furthermore, household size was not a determinant of the premium farmers were willing to pay for insurance. In this study, education was not a significant determinant, while total flock size was a significant determinant for pig and poultry farmers. Furthermore, household size was a significant determinant of the premium poultry farmers were willing to pay for insurance.

4.CONCLUSION

The higher the insurance premium, the lower the number of farmers willing to pay for LFI. The majority of farmers (40.7%, 175) were willing to pay 50.000 CFA or less annually for LFI, with a proportion of 20.9% for poultry farmers and 19.8% for pig farmers.The Bamboutos and Mifi Divisions are the main pig and poultry production areas with many small-scale farms that cannot afford to pay more than 50,000 CFA for some and 100,000 CFA for others. Furthermore, some pig farmers with relatively large farms in the Upper-Plateau, Bamboutos and Mifi Divisions were willing to pay higher premiums for LFI.

Regarding poultry farmers' socioeconomic factors, the Chi-Square Test and Wald Statistics highlighted household size as a significant and critical determinant. For production factors, Chi-Square indicated that the premium farmers were willing to pay for a livestock insurance scheme were significantly associated with the number of farms, the total size of the flock, and the setting type. After controlling determinants for each other, Wald Statistics highlighted only the total size of the flock as a significant and critical predictor. Production factors predicted the premium poultry farmers are willing to pay for LFI more than socioeconomic factors, with predictive power/explanatory power (PP/EP) of 33.9% and 9.5%, respectively. The Integrated Value Mapping (IVM) combining the predictive effects of both components was 38.0%, thus implying that with 62.0% variability not explained, there are other factors to reckon with.

For pig farmers' socioeconomic factors, the Chi-Square Test indicated that sex, age, household size, years of experience, principal occupation, marital status and annual farming income were essential determinants of the premium that farmers are willing to pay for LFI. After controlling determinants for each other, Wald Statistics highlighted three significant determinants (years of farming experience, household size and annual farming income). Beyond this, they were all critical determinants. For production factors, the Chi-Square Test indicated that the premium farmers were willing to pay for a livestock insurance scheme was significantly associated with farmers' source of labour, number of farms, flock size, division of operation and source of capital. After controlling determinants for each other, Wald Statistics highlighted the total size of the flock and division as significant determinants of the amount willing to pay for a livestock insurance scheme. Beyond this, two of them were critical predictors. Socioeconomic factors predicted willingness to subscribe to a livestock insurance scheme almost at the same level as production factors, with a predictive power/explanatory (PP/EP) of 61.6% and 62.4%, respectively. The Integrated Value Mapping (IVM) combining the predictive effects of both components was 74.3%, thus implying that with 25.7% variability not explained, there are other factors to reckon with.

5. RECOMMENDATION

Based on the findings, it is recommended that the Cameroon Ministry of Finance (MINFI), in collaboration with the Ministry of Livestock Fisheries and Animal Husbandry (MINEPIA), the World Bank and insurance stakeholders should establish premium subsidies for small-scale poultry and pig farmers. Efforts should be made to educate farmers about the importance of insurance as a risk management tool.

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