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The Gap Between Actuarial Premiums and Market Gardeners' Contribution Capacity: Feasibility Challenges for Flood Agricultural Microinsurance in Kinshasa, Democratic Republic of the Congo

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Abstract

Background: *Floods constitute a major risk to market gardening activities in Kinshasa. They can cause production and income losses that exceed the financial capacity of family farms. In this context, agricultural insurance can contribute to transferring part of the risk, but its development depends on the possibility of offering a premium that is compatible with producers' contribution capacity. The objective of this study is to analyze the gap between the observed level of risk, the theoretical actuarial premium, and market gardeners' contribution capacity for flood microinsurance.*

Materials and Methods: *The study involved 123 market gardeners surveyed at four sites in Kinshasa: Kingabwa-Ngwele, Masina-Tshuenge, Ndjili-CECOMAF, and Kimwenza-Gare. Data were collected using a questionnaire covering socioeconomic characteristics, flood exposure, agricultural losses, vulnerability, knowledge of insurance, and willingness to participate in a microinsurance scheme. The analyses combined descriptive statistics, association tests, comparisons of production before and after flooding, regression analyses, and actuarial estimation of the premium.*

Results: *The results show that 83.7% of market gardeners experienced at least two floods during the agricultural period considered. The average financial loss was estimated at USD 277.65 per farm, while the average loss rate reported in the study was 83.5%. Average production decreased from USD 328.46 before flooding to USD 50.81 after flooding. The calculated pure premium was USD 232.19, while the commercial premium, after applying a 25% loading, reached USD 290.24. Furthermore, 60.2% of respondents expressed support for subscribing to agricultural insurance, and 57.7% reported being willing to make a financial contribution. However, 73.2% indicated a contribution capacity of less than USD 10 per agricultural season, highlighting a substantial gap between the theoretical cost of risk and producers' contribution capacity.*

Conclusion: *The feasibility of flood agricultural microinsurance in Kinshasa therefore depends not only on the existence of insurance demand, but also on the financing mechanism and the level of contribution required from producers. The findings support the relevance of a mutual or cooperative scheme that enables risk sharing and the mobilization of complementary financing mechanisms.*

Keywords: *agricultural insurance; microinsurance; floods; market gardening; actuarial premium; contribution capacity; Kinshasa.*

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I. Introduction

II. Materials and Methods

Market gardening plays an important role in supplying food to households in Kinshasa and constitutes a source of income for many producers operating in urban and peri-urban areas. In these areas, farms are often small-scale and have limited financial resources. This situation makes producers particularly vulnerable to events that may interrupt production or destroy crops. Among these events, floods represent a risk directly associated with heavy rainfall, the overflow of watercourses, and inadequate water drainage[1,2,3].

In the market-gardening sites studied, flooding is not merely a physical problem associated with the temporary presence of water. It also has economic consequences. Crop destruction reduces the quantity of marketable produce, leads to a decline in expected income, and may force producers to incur additional expenses

to resume their activities. When such losses occur repeatedly, they can weaken the farm's productive capital and reduce the producer's ability to cope with a subsequent agricultural season[4,5].

Risk management therefore becomes a central issue. Producers may adopt various strategies before, during, or after flooding, including adjusting the agricultural calendar, improving drainage, raising planting beds, temporarily relocating crops, or mobilizing personal resources. These strategies may reduce some of the effects of the risk, but they do not necessarily compensate for all financial losses. Agricultural insurance can therefore serve as a complementary mechanism based on transferring part of the risk to a risk-pooling arrangement[4,6].

In principle, agricultural insurance enables the insured party to pay a contribution in exchange for compensation when the covered event occurs under the terms and conditions of the contract. For small-scale producers, however, the challenge is to design a product whose premium is consistent with the insured risk while remaining compatible with available resources. A premium calculated solely on the basis of loss experience may be too high relative to farm income. Conversely, a very low contribution may not provide the scheme with sufficient resources to compensate for claims[6,7].

This tension between the cost of risk and contribution capacity constitutes the starting point of the present study. It is not sufficient to establish that producers are interested in insurance; it is also necessary to examine what they are actually able to pay. The distinction between willingness to pay and contribution capacity is important: a producer may state that they wish to be insured while being unable to finance a premium corresponding to the actuarial level of risk[6,7].

Studies on agricultural insurance generally show that risk pooling, producer information, trust in the insurance institution, and product design influence participation. Hazell (1992), in particular, emphasizes the importance of economic and institutional constraints in the development of agricultural insurance for small-scale producers. Mahul and Stutley (2010) likewise stress the need to adapt insurance mechanisms to the characteristics of agricultural risks, producers' capacities, and the institutional environment[6,7].

In the context of Kinshasa, this issue is particularly important because the market gardeners studied are exposed to flooding episodes that may result in substantial losses, while their agricultural incomes remain relatively low[1,3]. The study conducted at four sites—Kingabwa-Ngwele, Masina-Tshuenge, Ndjili-CECOMAF, and Kimwenza-Gare—therefore makes it possible to examine the relationship among three dimensions: exposure to risk, the economic cost of losses, and producers' ability to participate financially in an insurance mechanism.

The survey data also indicate that the issue is related to the level of information available. Limited knowledge of agricultural insurance may constrain effective demand. In the sample, only 17.9% of producers reported having knowledge of agricultural insurance before the concept was explained. Following the presentation of the insurance principle, however, a substantial proportion of respondents considered that insurance could help reduce the economic consequences of flooding.

From this perspective, premium estimation constitutes an important step. The pure premium can be approximated on the basis of the probability of occurrence of the insured event and the average financial loss. In the present study, it is estimated using the relationship $PP = q \times L$, where PP represents the pure premium, q the observed probability of the risk, and L the average financial loss. Based on the values obtained from the survey, namely $q = 0.837$ and $L = USD\ 277.65$, the pure premium is estimated at USD 232.19. A commercial premium of USD 290.24 is subsequently obtained by applying a 25% loading.

These amounts should be interpreted as theoretical estimates derived from the study data rather than as definitive rates that could be directly applied to producers. Their primary purpose is to measure the gap between the estimated cost of risk and the financial contribution that producers report being able to afford.

The general objective of this article is therefore to analyze the feasibility of flood agricultural microinsurance in Kinshasa, with particular emphasis on the gap between the actuarial premium and market gardeners' contribution capacity. More specifically, the study aims to characterize exposure to flooding, measure economic losses, estimate the actuarial premium, analyze willingness to participate and contribution capacity, and subsequently discuss the conditions required for an appropriate insurance mechanism.

The main research question is: To what extent is the premium corresponding to the observed level of flood risk compatible with the contribution capacity of market gardeners in Kinshasa? The hypothesis is that producers may have genuine interest in insurance, but that a premium calculated on the basis of observed losses may exceed their individual contribution capacity, thereby justifying the exploration of risk-pooling and shared-financing mechanisms.

This study therefore seeks to move beyond a simple assessment of insurance demand. It establishes a relationship between risk, loss, and producers' financial capacity. Such an approach provides a better understanding of why a population may express a willingness to participate in insurance while simultaneously facing difficulties in financing a premium that is actuarially consistent with the risk covered.

2.1. Study Area

The study was conducted in the city-province of Kinshasa, Democratic Republic of the Congo, among market gardeners engaged in horticultural production at four sites exposed to flood risks. The selected sites were Kingabwa-Ngwele, Masina-Tshuenge, Ndjili-CECOMAF, and Kimwenza-Gare. Their selection made it possible to account for different agricultural conditions and levels of risk exposure within the urban area of Kinshasa.

The market gardening systems examined were mainly characterized by small-scale farms and a strong dependence on produce sold in local markets. The crops observed included, in particular, amaranth and sweet potato leaves. The sensitivity of these crops to excess water constitutes an important factor in the analysis of agricultural losses.

2.2. Study Population and Sampling

The study population consisted of market gardeners operating at the four selected sites. The final sample comprised 123 market gardeners, distributed as follows: 33 respondents from Kingabwa-Ngwele, 29 from Masina-Tshuenge, 29 from Ndjili-CECOMAF, and 32 from Kimwenza-Gare.

The number of observations allowed for a descriptive analysis of flood exposure, economic losses, risk perception, and interest in agricultural insurance. Multivariate analyses were interpreted with consideration of the sample size and the exploratory nature of certain relationships.

Table 1. Distribution of Respondents by Agricultural Site

Agricultural Site	Frequency	Percentage (%) (%)
Kingabwa-Ngwele	33	26,8
Masina-Tshuenge	29	23,6
Ndjili-CECOMAF	29	23,6
Kimwenza-Gare	32	26,0
Total	123	100,0

2.3. Data Collection

Data were collected using a structured questionnaire administered to market gardeners. The questionnaire covered farm identification, sociodemographic characteristics, cultivated areas, production, agricultural income, producers' experience, exposure to flooding, recorded losses, risk management strategies, vulnerability perception, and attitudes toward agricultural insurance.

The questions relating to flooding were designed to document the frequency and intensity of flood events, the proportion of cultivated area affected, the duration of water stagnation, perceived causes, and the consequences for agricultural production. The economic information collected was used to estimate the financial losses associated with flood events.

A specific section of the questionnaire focused on agricultural insurance. It distinguished between prior knowledge of the insurance product, trust in an insurance scheme, willingness to participate, and willingness to pay. This distinction was maintained in order to avoid interpreting a simple expression of interest as evidence of actual financing capacity.

2.4. Study Variables

The explanatory variables included sex, age, educational level, agricultural experience, monthly agricultural income, cultivated area, flood frequency, losses incurred, access to credit, membership in an organization, training, risk perception, vulnerability score, and agricultural site.

The financial loss variable represents the estimated amount of economic losses associated with flooding. Production before and after flooding was compared in order to measure the reduction in productive value. Vulnerability was assessed using a set of indicators related to exposure to risk and its consequences.

For the analysis of insurance demand, the variable of interest distinguishes producers who were favorable toward participation in or contribution to an insurance scheme from those who were not. Contribution capacity was assessed based on the amount that producers reported being able to allocate to insurance per agricultural season.

2.5. Statistical Processing and Analysis

The data were processed and analyzed using SPSS statistical software. Descriptive statistics were used to calculate frequencies, percentages, means, and standard deviations. Chi-square tests were used to examine selected associations between categorical variables.

The comparison between expected production before flooding and observed production after the event was performed using a paired-samples t-test. Differences between sites were examined using analysis of variance (ANOVA) when the underlying assumptions were satisfied.

Multiple linear regression was used to examine factors associated with financial losses. Binary logistic regression was employed to analyze factors associated with willingness to participate in or contribute to an insurance scheme. Odds ratios (ORs) were used to facilitate the interpretation of associations.
The statistical significance threshold was set at 5%. Statistical results were interpreted jointly with economic information and the context of the farms in order to avoid interpreting a statistical association as a causal relationship.

2.6. Actuarial Premium Estimation

The pure premium was estimated based on the observed probability of the risk and the average financial loss. The formula used was:
PP = q × L
where **PP** represents the pure premium, **q** the probability of occurrence of the risk, and **L** the observed average financial loss. In the study, the proportion of producers who experienced at least two floods was 83.7%, corresponding to **q = 0.837**, while the average financial loss was **USD 277.65**.
The calculation therefore gives:
PP = 0.837 × 277.65 = USD 232.19.
A theoretical commercial premium was then obtained by applying a 25% loading intended to account for additional costs associated with the insurance scheme. The formula was:
CP = PP × (1 + α)
with **α = 25%**. Thus:
CP = 232.19 × 1.25 = USD 290.24.
This estimate represents an actuarial approximation based on the information available from the survey. It does not replace professional insurance pricing that incorporates the precise risk structure, administrative expenses, reinsurance costs, and the frequency and severity of claims over a sufficiently long historical series.

III. Results

3.1. General Characteristics of the Respondents

The sample comprised 123 market gardeners distributed across the four study sites. Men accounted for 61.8% of the respondents, compared with 38.2% women. The age structure showed a substantial proportion of producers belonging to the older age groups. Producers with more than 20 years of agricultural experience represented 35.8% of the sample.

The results also show that market gardening constitutes a relatively modest income-generating activity for a significant proportion of respondents. Nearly half of the producers (48.8%) reported a monthly agricultural income ranging from USD 100 to USD 300, while 31.7% reported earning less than USD 100 per month. This financial situation is an essential consideration when analyzing contribution capacity.
Regarding cultivated areas, 90.2% of producers used planting beds (*planches*) as the practical unit for organizing their plots. The most frequently reported crops included amaranth, cited by 74.8% of respondents, and sweet potato leaves, cited by 61.8%.

Table 2. Selected Socioeconomic Characteristics of the Respondents

Indicator	Result (%)
Male	61.8
Female	38.2
Income: USD 100–300/month	48.8
Income: < USD 100/month	31.7
Experience: >20 years	35.8
Use of planting beds (*planches*)	90.2
Amaranth cultivated	74.8
Sweet potato leaves cultivated	61.8

3.2. Flood Exposure

Exposure to flooding was high in the sample. Overall, 83.7% of market gardeners reported experiencing at least two flood events during the agricultural period considered. This frequency indicates that flooding is not an exceptional event for a large proportion of the farms surveyed.
Regarding intensity, 46.3% of market gardeners described the floods as very severe, resulting in substantial crop destruction. More than half of the respondents (51.2%) reported that more than 75% of their cultivated area or production was affected during the events considered.
The main causes reported were heavy rainfall, cited by 94.3% of respondents, and the overflow of watercourses, cited by 82.1%. Water stagnation was generally relatively short, with 77.8% reporting a duration of less than one day. However, a short duration does not necessarily imply limited losses.

Table 3. Main Indicators of Flood Exposure

Indicator	Percentage (%)
At least two flood events	83.7
Very severe flooding	46.3
>75% affected	51.2
Heavy rainfall as a cause	94.3
Overflow of watercourses	82.1
Water stagnation <1 day	77.8

3.3. Production and Financial Losses

Flooding resulted in a substantial reduction in production. Mean production before flooding was estimated at USD 328.46, compared with USD 50.81 after flooding. The comparison between the two production levels indicated a statistically significant reduction. The paired-samples *t*-test yielded $t = 6.217$, with $p < 0.001$.

Production losses were also substantial in relative terms. Overall, 52.8% of market gardeners reported losing more than 75% of their production. The mean financial loss was estimated at USD 277.65 per farm, while the average reported loss rate was 83.5%.

These findings show that flooding represents both a physical and an economic risk. Producers do not merely lose crops; they also lose part of the value that would have contributed to their income and to the continuation of the following agricultural season.

Table 4. Economic Indicators of Flood-Related Losses

Indicator	**Value**
Mean production before flooding (USD)	**328.46**
Mean production after flooding (USD)	**50.81**
Mean financial loss (USD)	**277.65**
Mean loss rate	**83.5%**
Loss of >75% of production	**52.8%**
Paired-samples *t*-test	**6.217**
***p*-value**	**<0.001**

3.4. Vulnerability and Factors Associated with Losses

The vulnerability analysis shows that a substantial proportion of market gardeners were in situations of moderate or high vulnerability. The vulnerability score makes it possible to account for several dimensions of exposure and the consequences of risk, rather than considering only the frequency of flooding.

The statistical analyses indicate an association between vulnerability and losses. Vulnerability was also associated with flood frequency and certain farm characteristics. This relationship is consistent with the notion that the same flood event may have different consequences depending on available resources, farm size, and adaptation opportunities.

The multiple linear regression performed on financial losses yielded an R^2 of 0.403 and an adjusted R^2 of 0.347. Thus, the model explained a substantial, although not complete, proportion of the variation in observed losses. Cultivated area and monthly agricultural income appeared to be significantly associated with financial losses, while vulnerability and agricultural experience showed more limited effects in the model.

The finding concerning cultivated area should be interpreted with caution, as a larger farm may involve a greater productive value and, consequently, may record a higher absolute loss when a large proportion of its production is destroyed.

Table 5. Summary of the Linear Regression on Financial Losses

Element	Result
R^2	0.403
Adjusted R^2	0.347
Durbin-Watson	1.771
Cultivated area	Significant
Monthly agricultural income	Significant
Vulnerability	Marginal effect
Agricultural experience	Marginal effect

3.5. Knowledge and Perception of Agricultural Insurance

Prior knowledge of agricultural insurance remains low. Only 17.9% of market gardeners reported having previously heard about agricultural insurance. This limited dissemination of information constitutes a potential obstacle to the development of an insurance product specifically designed for market gardening.

After the insurance principle was explained, 61.4% of respondents considered that such a mechanism could help them cope with the consequences of flooding. Furthermore, 54.5% reported that they could trust an

insurance scheme. These findings indicate that limited prior knowledge does not necessarily imply an absence of interest.

The gap between knowledge, trust, and willingness to participate suggests that the introduction of a microinsurance scheme would require substantial information and awareness-raising efforts.

Table 6. Perception of Agricultural Insurance

Indicator	Percentage (%)
Have knowledge of agricultural insurance	17.9
Believe that insurance can help	61.4
Trust the insurance scheme	54.5
Favor participation	60.2
Willing to contribute	57.7

3.6. Willingness to Participate and Contribution Capacity

Overall, 60.2% of the market gardeners surveyed reported being favorable toward participating in an agricultural insurance scheme against flood risks. This proportion indicates the existence of potential demand. However, willingness to participate must be distinguished from contribution capacity.

Regarding payment, 57.7% of respondents reported being willing to make a financial contribution to an insurance scheme. Among producers who accepted the principle of making a contribution, the majority indicated an amount of less than USD 10 per agricultural season. According to the results available in the study, 73.2% were willing to pay less than USD 10 per season.

These amounts are substantially lower than the pure premium of USD 232.19 and the theoretical commercial premium of USD 290.24. This gap indicates that an individual insurance scheme based on an actuarial premium designed to fully cover the average loss is not compatible with the contribution capacity reported by the producers.

Table 7. Comparison Between the Theoretical Cost of Risk and Contribution Capacity

Indicator	Amount / Proportion
Mean financial loss	USD 277.65
Observed probability of risk	83.7%
Pure premium	USD 232.19
Commercial premium (+25%)	USD 290.24
Favorable toward participation	60.2%
Willing to contribute	57.7%
Contribution < USD 10/season	73.2%

3.7. Analysis of the Determinants of Insurance Demand

The logistic regression analyses conducted as part of the study show that the characteristics of market gardeners do not all play the same role in their willingness to contribute to agricultural insurance. In the model examining willingness to pay, the Kingabwa site was associated with a higher likelihood of reporting a favorable response, with an odds ratio of approximately 18.8. Secondary education was also statistically significant.

Sex and agricultural experience showed more limited associations depending on the model considered, while several other variables were not statistically significant. These findings indicate that interest in insurance does not depend on a single socioeconomic characteristic.

In the participation model, the study site and vulnerability score emerged as important factors. The finding concerning vulnerability is particularly relevant for a flood insurance product: producers who are more exposed or more vulnerable may perceive the potential benefits of risk transfer more directly.

The econometric results should nevertheless be interpreted as associations observed within the sample rather than as causal effects.

Table 8. Main Factors Associated with Willingness to Pay

Variable	Reported Result	Interpretation
Kingabwa site	OR ≈ 18.8; significant	Positive association
Secondary education	Significant	Association with willingness to pay
Sex	Marginal, depending on the model	Limited association
Agricultural experience	Marginal, depending on the model	Limited association
Other variables	Not significant	No statistically established association

3.8. Gap Between the Actuarial Premium and Contribution Capacity

The central finding of the study is the existence of a substantial gap between the premium estimated on the basis of risk and the amount that market gardeners report being able to pay. The pure premium of USD 232.19 represents

a significant proportion of the monthly agricultural income reported by a large share of respondents. The commercial premium of USD 290.24 further widens this gap.

From an analytical perspective, the reported contribution capacity of less than USD 10 per agricultural season among 73.2% of market gardeners willing to contribute is substantially below the calculated actuarial premium. However, this gap should not be interpreted as evidence that insurance is unfeasible. Rather, it indicates that an individual insurance scheme designed to cover the entire average loss is not consistent with the observed financial capacities of the producers.

One possible approach is therefore to pool the risk among several market gardeners. Under a cooperative scheme, contributions could be pooled into a common fund. However, risk pooling alone does not eliminate the actuarial gap. Where necessary, it should be complemented by shared-financing mechanisms, targeted subsidies, or institutional partnerships.

IV. Discussion

The findings of this study confirm the economic importance of flooding for the market-gardening farms investigated in Kinshasa. The high frequency of flood events, the substantial proportion of producers reporting destruction of more than 75% of their production, and the mean financial loss of USD 277.65 show that climate-related risk can directly affect the economic viability of these activities.

The comparison of production before and after flooding provides an important finding. Mean production decreased from USD 328.46 to USD 50.81, and the difference was statistically significant. This decline illustrates the ability of flooding to rapidly transform production intended to generate income into an economic loss.

The results are consistent with the agricultural risk management approach developed in the literature. Hazell (1992) emphasizes that agricultural producers face multiple risks and that risk-management mechanisms must take into account their limited resources. Insurance should therefore not be considered in isolation, but rather as a complementary instrument alongside adaptation strategies.

The frequency of flooding observed in the sample is important for premium pricing. A probability of 83.7% results in a high pure premium when combined with an average loss of USD 277.65. The resulting estimate of USD 232.19 is directly related to the formula used and the values observed in the survey.

The main challenge is affordability. Mahul and Stutley (2010) show that the design of agricultural insurance schemes must take into account market conditions, risks, administrative costs, and producers' financial capacity. In the Kinshasa case examined here, the gap between the theoretical premium and the reported contribution capacity is substantial.

The finding concerning insurance knowledge is also important. Only 17.9% of market gardeners reported knowing about agricultural insurance before the product was explained. Limited knowledge may influence risk perception and trust in the institution. However, the fact that 54.5% of market gardeners reported that they could trust an insurance scheme indicates that a potential basis for trust exists.

The increase from 17.9% prior knowledge to 60.2% of producers favoring participation after the insurance concept was explained highlights the importance of information. However, a stated intention in a survey does not automatically translate into actual participation accompanied by premium payment.

The fact that 57.7% of market gardeners reported being willing to contribute represents an indication of potential demand. However, the amount they are able to contribute is crucial. When 73.2% report a contribution capacity of less than USD 10 per agricultural season, the issue becomes one of financial product design.

A microinsurance scheme adapted to the local context should seek to provide coverage corresponding to clearly defined risks, with contributions compatible with producers' incomes. One option would be to limit indemnification to specific events or levels of loss, which could reduce the cost of coverage. Another option would be to use simplified insurance products where the technical and institutional conditions allow for their implementation.

A cooperative model appears consistent with the findings of this study. It could bring market gardeners together, improve information dissemination, and facilitate contribution collection. It could also serve as an interface between producers, insurance institutions, professional organizations, and financial partners.

Shared financing could constitute a second component. The gap between a contribution of less than USD 10 and a pure premium of USD 232.19 is too large to be absorbed solely through a modest adjustment of the premium. A scheme targeting small-scale producers should therefore consider the possibility of external support, particularly during the start-up phase.

The differences observed between sites also deserve consideration. The fact that the study site was associated with willingness to pay or participate indicates that local conditions may influence risk perception and interest in insurance. A single product applied identically across all sites might therefore fail to account for differences in exposure, income, or collective organization.

The regression results on losses show that cultivated area and monthly agricultural income are associated with financial losses. This suggests that pricing based solely on the absolute amount of loss could disadvantage farms with greater productive investments.

The findings should be considered in light of the limitations of the approach used. The 83.7% probability is based on market gardeners' reports for the agricultural period considered and does not constitute a historical claims series. It therefore cannot be interpreted as a definitive long-term actuarial probability. Similarly, the mean loss of USD 277.65 represents the sample average and may vary according to farm size, crops, location, and event intensity.

The USD 232.19 premium should therefore be regarded as a reference estimate intended to measure the theoretical cost of risk based on the available data. To develop a commercially viable insurance product, an insurance company or mutual scheme would require longer historical series, meteorological and hydrological data, precise information on insured areas and crops, as well as estimates of administrative and reinsurance costs.

Despite these limitations, the analysis remains relevant. It demonstrates that the agricultural insurance issue in Kinshasa cannot be reduced to the presence or absence of demand. Market gardeners may recognize the usefulness of insurance while being financially unable to afford a premium calculated on the basis of substantial losses.

The development of such a product could begin with a pilot phase in a limited number of sites. This phase would make it possible to test contribution-collection mechanisms, claims-reporting procedures, compensation timelines, producers' level of trust, and the financial balance of the scheme.

The development of agricultural microinsurance should be accompanied by an information strategy. Producers need to understand precisely what is covered, what is excluded, under which conditions compensation is triggered, and how the contribution is calculated. Transparency is particularly important in a context where institutional trust may influence the decision to participate.

Ultimately, the feasibility of flood agricultural microinsurance in Kinshasa appears to depend on a combination of several elements: precise risk identification, risk pooling, affordable contributions, producer information, shared-financing mechanisms, and transparent governance.

V. Conclusion

This study aimed to analyze the gap between the actuarial premium and market gardeners' contribution capacity in order to assess the feasibility of agricultural microinsurance against floods in Kinshasa. The findings obtained from 123 market gardeners across four sites show that flooding constitutes a frequent and economically significant risk.

The high frequency of flooding, production losses, and the mean financial loss of USD 277.65 demonstrate the need for complementary risk-management mechanisms. Mean production decreased from USD 328.46 before flooding to USD 50.81 after the event, with a statistically significant difference.

The actuarial estimate based on the available data yielded a pure premium of USD 232.19 and a theoretical commercial premium of USD 290.24. These amounts are substantially higher than the contribution capacity reported by the majority of producers, 73.2% of whom indicated that they could contribute less than USD 10 per agricultural season.

At the same time, 60.2% of market gardeners reported being favorable toward participation, while 57.7% stated that they were willing to make a financial contribution. Thus, potential demand exists, but this demand remains conditional on product affordability, trust, and the level of contribution required.

The findings support a microinsurance approach based on risk pooling and shared financing rather than a model relying exclusively on an individual premium corresponding to the average actuarial loss. A cooperative scheme could provide an organizational basis for testing such an approach.

Further research is needed to establish more robust pricing based on historical claims series, meteorological data, detailed crop characteristics, and a comprehensive assessment of administrative and operational costs. A pilot phase would also make it possible to assess the gap between stated willingness and actual payment behavior.

Ultimately, the central issue is not simply whether market gardeners wish to be insured, but how to design a system whose contribution is affordable for producers while ensuring financially sustainable compensation.

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