HOUSEHOLDS IN FLOOD-PRONE AREAS: THE CASE IN BARANGAY DAGUMA, BAGUMBAYAN, SULTAN KUDARAT

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***Abstract*- Floods constitute a huge global concern, exacerbated by climate change, resulting in economic damage and loss of life. Relocation has emerged as an important adaptive approach for dealing with periodic floods, with global examples demonstrating its usefulness. The Philippines, one of Southeast Asia's most flood-prone countries, is dealing with recurring flooding, forcing large-scale evacuations and planned relocations. Brgy Daguma, Bagumbayan, Sultan Kudarat is frequently affected by floods. This study examined the residents' profile in a flood-prone area, the different factors concerning their willingness to relocate, and their involvement in the planning process of the relocation program. The findings disclosed the minimal participation of the community in the relocation planning, despite have adequate information and awareness. Their willingness to relocate is still shrouded by various factors including government support and participation, emotional impact, and distance from the relocation site.**

Keywords: **Flood prone areas, Community participation, Brgy Daguma**

Introduction

Floods are among the most common natural disasters that impact millions of people worldwide (Salman &AB Li, 2018). The frequency and scope of flooding have increased significantly due to climate change (Kakinuma et al., 2020). Accounting for over 44% of all-natural disasters, floods have caused substantial economic losses and loss of life (WMO, 2021). Particularly vulnerable are regions near river basins, where climate-induced precipitation has intensified (Eccles et al., 2019). To mitigate flooding's effects and foster resilient communities, the global community recognizes the importance of adaptive measures and international cooperation.

Relocation has emerged as a crucial adaptive strategy for addressing recurring floods (Sharifi, 2020). In various parts of the world, such as Fiji, and communities facing chronic flooding, planned relocations to safer areas have been undertaken (Neef et al., 2018). These initiatives aimed to reduce disaster risk, save lives, and enhance resilience. Noteworthy examples include the Netherlands' "Room for the River" program, which involved relocating residences (Edelenbos et al., 2016), and Bangladesh's efforts to construct climate-resilient floating settlements (Chowdhury & Moore, 2017). In Europe, relocation to safer regions is one of four adaptive strategies for flood management, demonstrating its effectiveness in minimizing economic and human losses (Alfieri et al., 2016). Global experiences like these serve as valuable models for developing and implementing flood relocation strategies worldwide.

The Philippines stands as one of Southeast Asia's most flood-prone nations, grappling with an average of 20 typhoons each year (Basconcillo, 2019). Its unique geographical location and geology render it susceptible to both riverine and coastal inundations (D'Ayala et al., 2016). This vulnerability is compounded by various factors, including its archipelagic nature, deforestation, the proliferation of informal settlements in flood-prone areas, and inadequate drainage systems (Williams et al., 2020). Notable flood events like Typhoon Ondoy in 2009, Typhoon Sendong in 2011, and Super Typhoon Yolanda in 2013 have vividly underscored the catastrophic consequences of such disasters, encompassing loss of life, infrastructure devastation, and profound economic disruption (Pulhin, 2016).

In response, the Philippine government has undertaken flood risk management strategies encompassing floodplain zoning, early warning systems, and infrastructure enhancements (Stoutjesdijk, 2018). Nevertheless, the implementation and upkeep of these measures, especially in densely populated urban areas, remain fraught with challenges (Mercado et al., 2021).

Recent years have witnessed a growing inclination towards relocation as an adaptive approach to confront the persistent threat of flooding in the Philippines (Jamero et al., 2019). The country's exposure to floods, coupled with the looming menace of typhoons and rising sea levels, has necessitated large-scale evacuations (Williams et al., 2020). To systematically move communities situated in high-risk flood zones, the government has introduced regulations and

programs like the "Resettlement Action Plan" (Partridge, 2020). Nonetheless, the execution of these plans encounters obstacles in securing suitable relocation sites, addressing the concerns of affected populations, and safeguarding their means of livelihood (Bodine et al., 2022). The Philippines' experience with flood-related relocation underscores the imperative need for community involvement, livelihood support, and sustained development efforts within the framework of relocation initiatives

Barangay Daguma is a small rural settlement close to the Daguma Mountain Range in the Sultan Kudarat province of the Philippines (Philatlas, 1990). Excerpted from Bagumbayan Municipality's official website, the municipality is strategically located in an elevated area of the province with a clear viewpoint. Physically, it has a notable feature called the Daguma Mountain Range that runs from North to South dominating a wide agricultural territory and bound the entire western stretch by the great Allah Valley. Poblacion, the capital barangay of Bagumbayan, is about fifteen kilometers from Isulan, the capital town, and is located near the eastern foot of the Daguma range.

Although less developed than the country's largest cities, this barangay still confronts a number of flooding-related issues (PSA, 2023). Due to its mountainous topography and proximity to rivers and streams, the region is particularly vulnerable to flash floods and landslides during the rainy season (Delina, 2021). Flooding is becoming more likely as a result of natural drainage patterns being disturbed by deforestation and land conversion for agriculture (MGB X, 2012). To lessen the effects of flooding, residents of Barangay Daguma frequently use conventional coping strategies, such as raised houses and evacuation plans (AHA Center, 2021). However, in the face of more frequent and severe floods connected to climate change, these precautions are not sufficient.

Further, Bagumbayan is currently in danger due to agricultural technology's use of chemical pesticides and insecticides. Investors arrived and presented new technologies, which significantly harmed the fertile soil. People moved and settled in the virgin forest from the adjacent town and province, using “kaingin” to clear the areas, and the same was practiced by some town residents. The once robust and productive soil is now highly susceptible to erosion. Minerals were also extracted by mining investors, which had an impact on the fertility of the land. Whether large or small scale, mining operations severely damaged the soil's fertility and beauty.

Local government officials and locals have looked at the potential of moving vulnerable households to safer regions within the barangay or close-by towns in response to recurrent flooding (Palanca-Tan & Bayog, 2021). While promising, this strategy faces logistical and social difficulties, such as those related to land availability, infrastructure development, and community acceptability (AHA Center, 2022). Locals may be aware of the need for relocation for their protection, but they frequently worry about the procedure and results (Buisan, 2019). Some of these worries relate to the suitability of the new locations, the preservation of local culture, and the uncertainty surrounding future employment (Milan, 2021). Furthermore, the level of community involvement and input may determine whether relocation is successful in a local setting (Dewa et al., 2022). Participating in decision-making with the community can assist in allaying their worries and improving their impression of relocation as a workable flood risk reduction option (Laurila-Pant et al., 2023).

Communities had been relocated more frequently in post-disaster recovery efforts during the past ten years with the hope that well-designed plans and their effective execution will boost resilience. Relocation has historically been the least preferred option for policy, despite the theory that doing so will lower the chance of future destruction. Communities that are relocated are frequently already underprivileged, and migration disrupts their social networks and economic stability, driving them deeper into poverty. In light of this, it is crucial to comprehend excellent relocation governance, in particular how local governments coordinate relocation with local actors, and notably taking into account increasing rates of post-disaster relocation initiatives, Iuchi and Mutter (2020).

The objective of this study is to determine the households in flood-prone areas of Brgy. Daguma. Specifically, the research sought to determine the following: (i) the socio demographic profile of Brgy Daguma, (ii) the frequency of flood in Brgy Daguma, Bagumbayan, Sultan Kudarat, (iii) the community participation in planned relocation, and (iv) the willingness of the affected residents to relocate.

The willingness of the community was crucial when it comes to voluntary relocation since it helped ensure that the processes are courteous, moral, and attentive to the needs and desires of the affected populations. Thus, contributing to a more successful and sustainable outcome for both the communities and the organizations or governments involved in the relocation efforts. Therefore, the study was beneficial for various reasons. It can be used by policymakers to improve current frameworks, making them more useful and receptive to the needs and preferences of the community involved. It can help by giving the community a voice, a chance to actively participate in the research process, and a feeling of being empowered. A more involved and knowledgeable community may result from a higher sense of ownership over the conclusions and suggestions, and as a basis for future studies and future researchers to explore more on the topic further with interested scholars in the field.

The conceptual framework of the study is anchored on the theory of Mizrak and Turan (2022) which stated that the people's preparation for relocation due to floods and landslides is affected by personal traits, risk perception, self-confidence, and social support. Figure 1 displays the study's conceptual framework.

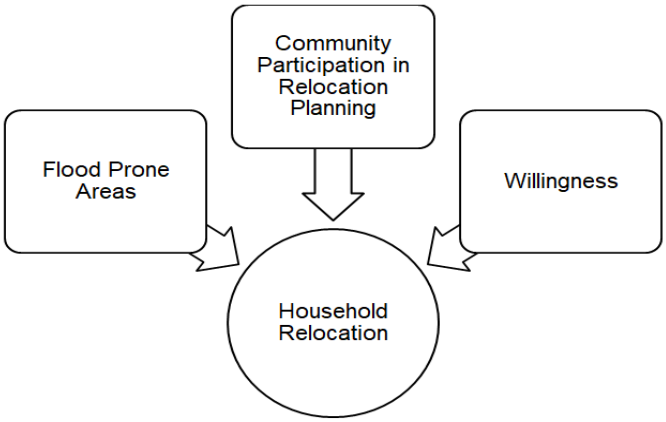


Figure 1. *Conceptual Framework of the Study*

This theoretical framework was supported by Lee's theory of Migration (1966), which explains the reasons behind why people relocate or migrate. Thus, it has investigated the demography of the households in the flood prone areas, the extent of community participation, and their willingness to which households engage in the relocation process in flood-prone areas.

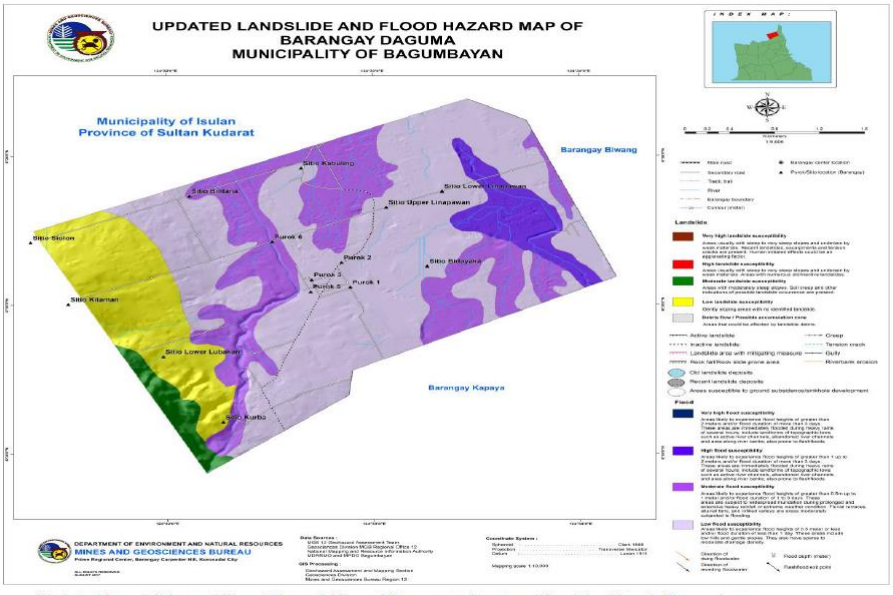
MATERIALS AND METHODS OF THE STUDY

Research Design

This study used the descriptive design by means of a case study in order to assess the households in flood-prone areas in Brgy. Daguma, Bagumbayan, Sultan Kudarat. Hassan, M. (2023), defined descriptive research design as a type of research methodology that aims to describe or record a group's or population's traits, actions, attitudes, opinions, or perceptions. Moreover, a Case Study entails a close analysis of a single person, a small group, or a situation to comprehend its dynamics fully. It is frequently used in psychology, sociology, and business to understand complicated phenomena or to establish study hypotheses.

Research Locale

The study was conducted at Brgy, Daguma, Bagumbayan, Sultan Kudarat with geographical location of 6.5846, 124.5477.



Updated Landslide and Flood Hazard Map of Barangay Daguma Municipality of Bagumbayan

Source: MDRRM, Bagumbayan, Sultan Kudarat

Figure 2. *Map showie updated landslide and flood hazard of Barangay Daguma, Bagumbayan, Sultan Kudarat*

Research Respondents

The participants were chosen by the researchers using purposive sampling. For each group, twenty (20) respondents from households who have been relocated, to be relocated, and waived relocation were selected as the sample size. Members of families in moderate to high-risk zones for floods, based on the developed exposure map of Brgy. Daguma, Bagumbayan, Sultan Kudarat participated in the key informant interview. The Barangay Captain and Barangay Committee in Disaster Risk Reduction were also included as respondents.

Research Instrument

A survey questionnaire was used to obtain community insight towards voluntary relocation. The survey questionnaire has four sections: (1) socio-demographics, (2) the current living circumstances, (3) the impact of flooding history and experience, and (4) the willingness to relocate. A five-point Likert Scale was employed for the respondents to answer the questions.

A. Frequency of community participation in relocation planning

Scale	Description
1	Never
2	Rarely
3	Sometimes
4	Often
5	Always

B. The willingness of the affected residents

Scale	Description
1	Very Unlikely
2	Unlikely
3	Neutral
4	Likely
5	Very Likely

Data Gathering Procedures

A self made survey instrument was used for data collection in this study. The researchers properly coordinated with the Disaster Risk Reduction and Management Offices for the Municipal and Barangay levels for possible assistance and support including the approval of the conduct of the study.

The level of flooding risk in Brgy Daguma, Bagumbayan, Sultan Kudarat, was determined through secondary data from the Municipal and Barangay Disaster Risk Reduction and Management Office including key informant interviews with the Barangay Captain and the members of the Barangay Committee on Disaster Risk Reduction.

The researchers administered survey questionnaires to the affected households with clear explanation on the purpose of the study and the corresponding instructions to answer the survey questionnaires. After collecting all of the essential data for the research study, the data collected were then presented, analyzed, and interpreted.

Scope and Limitation

The study is limited only in Brgy Daguma, Bagumbayan, Sultan Kudarat with 60 purposely selected household members in the barangay.

Ethical Provisions

Ethical principles were used as a guide for conducting the survey. The Participants were fully informed and willingly cooperated with transparent and unbiased questions. The researchers made sure that anonymity and data confidentiality were upheld. The survey allowed withdrawal, and committed on using the collected data responsibly for the benefit of the society.

RESULTS AND DISCUSSION

Demographic Profile of the Respondents.

Presented in Table 1 is the demographic profile of the respondents. In terms of the gender distribution, 61.7% of residents interviewed were male and 38.3% were female.

The majority of surveyed respondents belonged to the working-age population, which typically includes individuals between the ages of 18 to 60 years. The age group 36-45 was significantly represented, accounting for 21.7%. This age group is often considered a prime working age and may have distinct needs and perspectives. It was then followed by

18-25 (20%), while ages 26-35, 46-55, and 56-65 had the same distribution accounting for 16.7%. A smaller percentage of the survey respondents (8.3%) belonged to the age group of 66 and over.

Married individuals made up most of the respondents at 63.3%, while single and widowed individuals accounted for smaller proportions, representing 28.3% and 8.3%, respectively. Further, in terms of household size, the result showed that 43.3% have more than 7 household members. Additionally, 38.3% had 5-7 members, 16.7% had 3-5 members, and 1.7% had 1-3 members.

Lastly, in terms of occupation, 55% were not engaged in employment, the remaining percentage were composed of employed (36.7%), students (2), retired (1.7), and 1 who preferred not to disclose their occupation status. Moreover, 12 of the 22 respondents, who answered that they were employed indicated that their employers' location had an impact on their relocation decision

Table 1 *Demographic Profile of the Respondents*

Profile Variable	f	%
Gender		
Male	37	61.7
Female	23	38.3
Age		
18-25	12	20.0
26-35	10	16.7
36-45	13	21.7
46-55	10	16.7
56-65	10	16.7
66+	5	8.3
Marital Status		
Single	17	28.3
Married	38	63.3
Widowed	5	8.3
Household Size		
1-3 Members	1	1.7
3-5 Members	10	16.7
5-7 Members	23	38.3
7+ Members	26	43.3
Occupation		
Employed	22	36.7
Unemployed	33	55.0
Student	3	5.0
Retired	1	1.7
Other/ Prefer not to say	1	1.7

Frequency of flood in Brgy Daguma, Bagumbayan, Sultan Kudarat

Barangay Daguma, Bagumbayan had already experienced a total of seventy-five (75) flooding incidents, from 2017 up to 2022, with an average of 12 incidents per year over this six-year period (Bagumbayan MDRRMO).

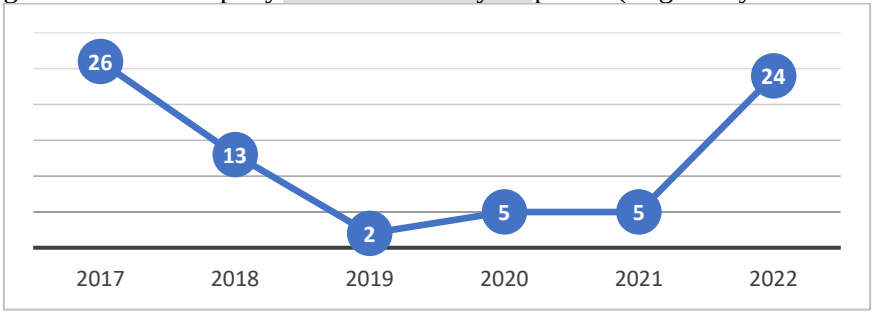


Figure 3. Graph showing the number of flooding incidents in Brgy. Daguma, Bagumbayan, Sultan Kudarat

A significant portion of respondents, comprising 72% of the sample, experienced flooding events 3-4 times a year, and 22% experienced more than 5 times a year. A smaller portion, covering 6%, encountered less than 3 flooding experiences a year. The result indicates that most of the residents are likely well-acquainted with the challenges and

impacts of such events. In spite of repeated experiences of flooding events in the community, a sense of place is seen as a functional mechanism that allows residents to adapt, as well as maintain, their residency (Anacio D et.al, 2016).

Community participation in relocation planning

The findings in Figure 4 show a startling trend of low levels of community participation in the context of relocation planning. It has showed that community meetings and workshops are rarely conducted although there were 3% of respondents said they sometimes or never had. This could be possibly attributed to several factors which include to but not limited to the following, lack of personnel, insufficient of funds, no logistical support, or maybe not a priority or could there would be a more priority one. Moralde, 2018 explained that the lack of implementation could be a result of the local administration's low priority for the program

When asked if they have access to information and updates, the survey revealed that 53% of the respondents reported never having such access, while 45% stated they rarely do. A mere 2% indicated they have access sometimes, with no respondents reporting frequent (often) or constant (always) access to this vital information. According to Zhang et al (2014) this might be due to lack of established or effective communication mechanisms and medium in place to convey information and updates to the community.

When it comes to providing input and feedback throughout the relocation planning process, a sizable 60% of respondents said they never had the opportunity, while 37% said they have such opportunities only rarely. Only 3% said they sometimes had a say in this matter, and none said they did so often or always. Imbalances in power between authorities and the community can lead to the community's unwillingness or inability to provide input (Geekiyanage et al., 2020).

Concerning involvement in relocation decision-making processes, 83% of respondents said they are rarely involved, with 15% feeling fully excluded (never participated). Only 2% said they were involved sometimes, while no one said they were often or always involved. Imbalances in power between authorities and the community can lead to the community's unwillingness or inability to provide input (Liveriero, 2020).

In terms of survey and data collection participation, 48% claimed rare involvement, 22% often, both 13% for never and sometimes, and 3% always, indicating a slightly greater level of engagement in this area. When members of the community participate in the planning and execution of surveys, they are more likely to participate because the data collection process is sensitive to local needs and concerns (Harrington et al., 2019).

When asked if they are aware of their rights and responsibilities during the relocation process, 77% said they are rarely aware, and 15% said they are completely unaware (never aware). Only 7% said they were sometimes aware, 2% said they were often aware, and no one said they were always aware. Community members may find it difficult to navigate and understand their rights in the relocation processes due to its complexity and their lack of information (Iuchi & Mutter, 2020).

Finally, when asked about their sentiments of empowerment and influence during the relocation process, a significant 85% confessed that they rarely have such feelings, whereas 7% sometimes do and 7% never do. Only 2% said they felt powerful often, and no one said they felt always empowered. Relocation decisions are frequently made by authorities or organizations without adequate input from the affected community, leaving residents feeling powerless and excluded (Sibanda & Lues, 2021).

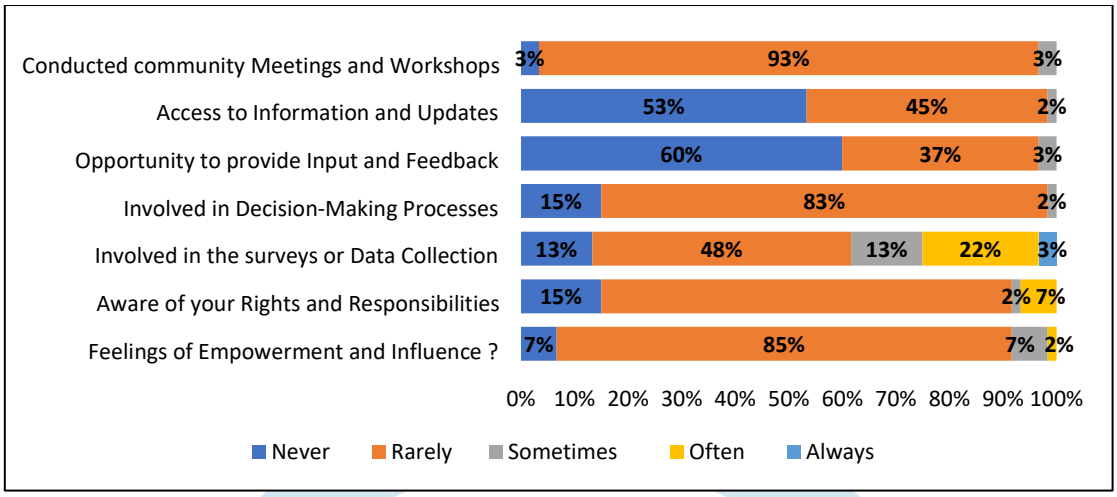


Figure 4. *Distribution of Five-point Likert-Scale responses measuring the community participation*

Figure 4 provides a troubling picture of restricted community involvement, information availability, and decision-making power in the relocation planning process. According to Rijal (2023) study, it emphasizes the critical need for improved community engagement and empowerment in such circumstances to guarantee more inclusive and fair decision-making processes.

The willingness of the affected residents to be relocated

Exhibited in Figure 5 are valuable insights into the attitudes of affected residents towards relocation due to flood risk. Although 57% of respondents were either unlikely or very unlikely to accept a relocation site further away, the responses show significant interest and openness to relocation among the affected residents. For instance, 35% of respondents were likely and 22% were very likely to relocate to a new area, indicating a willingness to make a change. Similarly, 22% of respondents were very likely to explore and evacuate potential housing options, which suggests adaptability in response to the flooding risk.

Interestingly, while a significant proportion of respondents thought that relocation would be unlikely to present them with new opportunities (33% very unlikely and 10% unlikely), a relatively high number of respondents (15% likely and 18% very likely) positively perceived relocation as an opportunity. This indicates that more information and communication on the advantages of relocation could persuade more residents that this is an opportunity worth pursuing. It is also noteworthy that government support was considered very influential in the relocation decision-making process by a high number of respondents (55% likely and 40% very likely). This highlights the importance of involving the government in the relocation process and proactively providing relevant information and resources to affected residents.

The emotional impact of the flood risk on the decision to relocate was found to be significant for 93% of respondents (53% likely and 40% very likely). This emphasizes the need to consider the psychosocial aspects of relocation and provide appropriate support services to help affected residents.

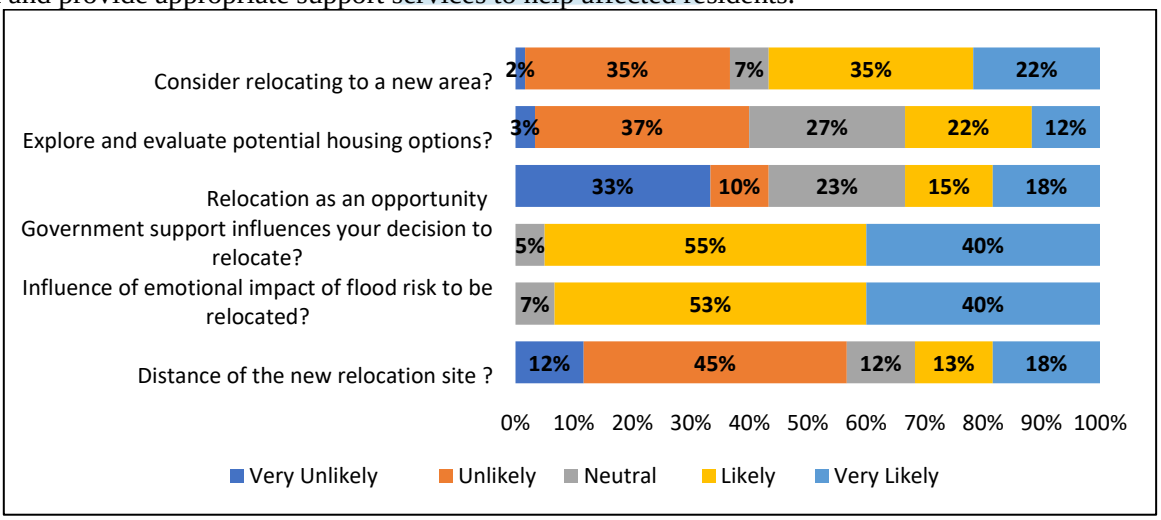


Figure 5. *Distribution of Five-point Likert-Scale responses measuring the willingness of the affected residents to be relocated*

CONCLUSION

Out of the total population of 4,878 in Brgy Daguma in Bagumbayan, Sultan Kudarat, 5.13% (250 individuals) are at major flood risk, while 16.07% (784 individuals) are exposed to moderate risk, and 78.32% (3,820 individuals) have a minor risk exposure. The locality from 2017 up to 2022, it has experienced 75 flooding incidents, with an average of 12 incidents annually affecting households within the flood prone area. Unfortunately, a majority (55%) of the respondents were unemployed, and 12 of the 22 employed respondents identified that their employers' location influenced their relocation decision. These data emphasized for the need for an 1) appropriate flood mitigation measures; 2) support for affected communities, and 3) tailored solutions for different households' needs.

In terms of the level of community participation in the relocation process, 93% or representing majority had an access to information and updates in case of eventualities, however, the involvement of the community in decision-making processes is quite low, thus, only a few residents about 7% have the feelings of empowerment and influence although, 33% of them viewed the relocation as an opportunity for a fresh start and improved living conditions.

RECOMMENDATIONS

This study recommends the following;

1. Continuous information and dessimination campaign to the local residents in the flood prone areas on disaster risk management;
2. Strengthen empowerment and involvement of the community in planning, decision and implementation of plans and programs together with the barangay concerned;
3. Sustainable flood control mitigating measures for both vegetation measures and infrastructure projects; and
4. Another similar research covering more barangays with more research parameters of the study;

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