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RESEARCH ARTICLE

The Impact Of Tidal Floods On Poor Households In The Sayung Coast, Demak Regency, Indonesia

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Abstract. The Sayung coast is an area subject to the direct influence of coastal disasters, particularly tidal floods. Tis research aimed to investigate the impact of tidal floods on social and economic aspects in Sayung Subdistrict. In order to achieve the aim, data collection was conducted through a systematic process comprising structured interviews carried out using a questionnaire. The research also implemented a random sampling methodology, comprising a total of 23 informants and in-depth interviews were conducted with key informants to augment its comprehensiveness. Following this, the data processing and analysis followed a mixed-method approach where quantitative and qualitative data were analyzed using the Structural Equation Model (SEM) and grounded theory. The obtained results showed that tidal floods had a significant direct impact is able to influence physical health, employment, and property at 62.32%, 69.59% and and 65.43% respectively. Furthermore indirect impact property is able to influence property value by 62.78%, physical health, property damages and employment can influence mental health by 71.71% and physical health, employment can affect mobility by 66.89%. The finding accounts for a new insight that tidal floods have direct and indirect impacts on the community, as examined using the mixed-method approach. The study of tidal flood impacts on poor households in Sayung Coastal, Demak, offers different findings from previous ones. Some previous studies discuss the general effects of tidal floods while disregarding the framework of the direct and indirect impacts of the floods on poor households. .

1. Introduction

The intricate correlation between natural disasters and poverty is underscored by the assertion that poverty engenders vulnerability, which in turn, leads to further impoverishment (Clark, 2006). As stated by pelling (2005), repeated shocks caused by natural disasters tend to inevitably diminish the economic strength of households, communities, and countries, thereby creating poverty and worsening vulnerability to future disasters (Pelling, 2005). Typically, disasters have an adverse influence on well-being and household poverty by detrimentally affecting both income and expenditures at the household level (Arouri et al., 2015). It is important to also establish that these natural phenomena led to a 6.9% and 7.1% decrease in per capita household income and expenditures, respectively (Bui et al., 2014). As previously stated, natural disasters induce poverty and this increases vulnerability, which, in turn, magnifies losses due to inadequate capacity to confront the occurrence of such phenomenon (Choirunnisa & Giyarsih, 2018; Ahmad & Afzal, 2019).

The northern coast of Java has been observed to experience significant development due to the strategic geographical location of the area and the availability of government support. This area is generally considered the most dynamic region in economic activities, some of which include maritime transportation, offshore industries, marine industries, and tourism. However, it is important to establish that the region is vulnerable to environmental hazards such as erosion and sedimentation (Handiani et al., 2022). Other environmental hazards, namely floods and inundation, which are typically caused by tidal waves and known as tidal floods, are also threats on the northern coast of Java (Buchori et al., 2021). According to a previous investigation, various types of coastal disasters have been experienced by coastal areas in Central Java, specifically in Semarang, Tegal, and Demak, where severe effects of tidal floods were observed (Irsadi et al., 2022; Handayani et al., 2020). Over the past two decades, coastal disasters in Demak have proven to be the most substantial among the three aforementioned areas, significantly impacting the North and South Java Coastal areas and extending to the broader context of Indonesia.

In Demak Regency, tidal floods have been observed to affect four subdistricts namely Sayung, Karang Tengah, Bonang, and Wedung. Among these coastal subdistricts, Sayung was found to experience the most severe impact (Ondara & Wisha, 2016; Gemilang et al., 2020). This is substantiated by the increasing intensity of tidal floods in Sayung, characterized by a daily inundation duration ranging between 6-8 hours, and exhibiting a worsening trend each passing year (Desmawan & Sukamdi, 2012; Sukamdi, 2019; Afifah & Hizbaron, 2020). Studies of tidal flood impacts were significant in number, yet most of the researchers solely focused on one method, which was either qualitative methods (Soedarsono, 2011; Bertoldo et

al., 2021; Maharlika et al., 2020, Hakim et al., 2022) and others use quantitative methods or quantitative methods (Utami et al., 2021; Hino et al., 2019; Radityasani & Wahyuni, 2020; Afifah & Hizbaron, 2020; Rudiarto et al., 2020). As a result, related studies on the topic using a mixed method remained few, while using the method would likely result in more comprehensive findings. In addition, studies of tidal flood impacts on certain economic groups were also rare because the common research objects only covered the community in general.

Therefore, this research aimed to analyze the impact of tidal floods on poor households in the coastal area of Sayung, Demak Regency. Lastly, it is important to acknowledge that the contribution of this present investigation indirectly complements and enriches previous research related to disasters in coastal areas.

2. Methods

This research adopted a mixed-method approach, which included the integration of both quantitative and qualitative methodologies to yield a more comprehensive, valid, reliable, and objective dataset (Creswell, 2009). This research uses a concurrent triangulation strategy. This study utilized a concurrent triangulation strategy. As explained by Cresswell (2009), in a concurrent strategy, researchers garnered quantitative and qualitative data concurrently (at one simultaneous time) and then compared them to identify either differences or combinations. Similarly, using a concurrent triangulation strategy, quantitative and qualitative data were gathered simultaneously. Collected data were then analyzed to reach the mixing of quantitative and qualitative data in the interpretation, analysis, and discussion stages, as indicated in Figure 1.

Quantitative analysis was performed using the Structural Equation Model (SEM) and validated through two tests namely, a Standardized Loading Factor (SLF) validity test and a Construct Reliability (CR) reliability test. Meanwhile, qualitative data was analyzed using grounded theory analysis and saturation testing. The survey was conducted in the Sayung coast, at four distinct villages namely Sriwulan, Bedono, Timbulsloko, and Surodadi, as presented in Figure 2. The impoverished households within the region totaled 2,775 (BPS, 2020), and the questionnaire used adopted Likert scale questions. Furthermore, the research sample was selected by adopting simple random sampling, ensuring homogeneity among population members and an equal likelihood of selection.

The gathered data were thoroughly analyzed both quantitatively and qualitatively throughout the interpretation, analysis, and discussion phases. By using a survey approach, the quantitative method was carried out with the aim of comprehending the impact of tidal floods on impoverished households. Simultaneously, the qualitative method, using grounded theory (Glaser & Strauss, 1967), was adopted to investigate and formulate theories surrounding the phenomenon.

The grounded theory methodology is systematically structured, comprising open, axial, and selective coding, leading to a saturation test. Furthermore, subjects were carefully selected to develop a comprehensive qualitative data description, guided by sampling theory principles and theoretical sampling criteria. Specifically, the subjects comprised long-term residents of the research location, residing for over 15 years, ensuring adequate and substantial knowledge and experience. Additionally, the research informants include both natives and migrants, with diverse occupations beyond maritime and fisheries. It is also important to state that the selected informants had distinctive characteristics, as evidenced by the 23 in-depth interviews conducted on the research area, from September 6 to December 28, 2023. Processing a total of 23 data samples, all recorded materials were transcribed into text. Table 1 details the demographic and social characteristics of informants, including gender, marital status, age, place of birth, length of stay, education level, and occupation.

The characteristics of informants in this research are outlined as follows: (1) Survey informants consisted of 69.57% males and 30.43% females. (2) The majority of informants were married (78.26%), with a small percentage being widowed (21.74%). (3) The age distribution shows that 39.13% fell within the 51-60 age range, with 21.74% in the 31-40 and 61-70 age brackets each, and 17.39% in the 41-50 years category. (4) 60.87% of informants were natives, while the

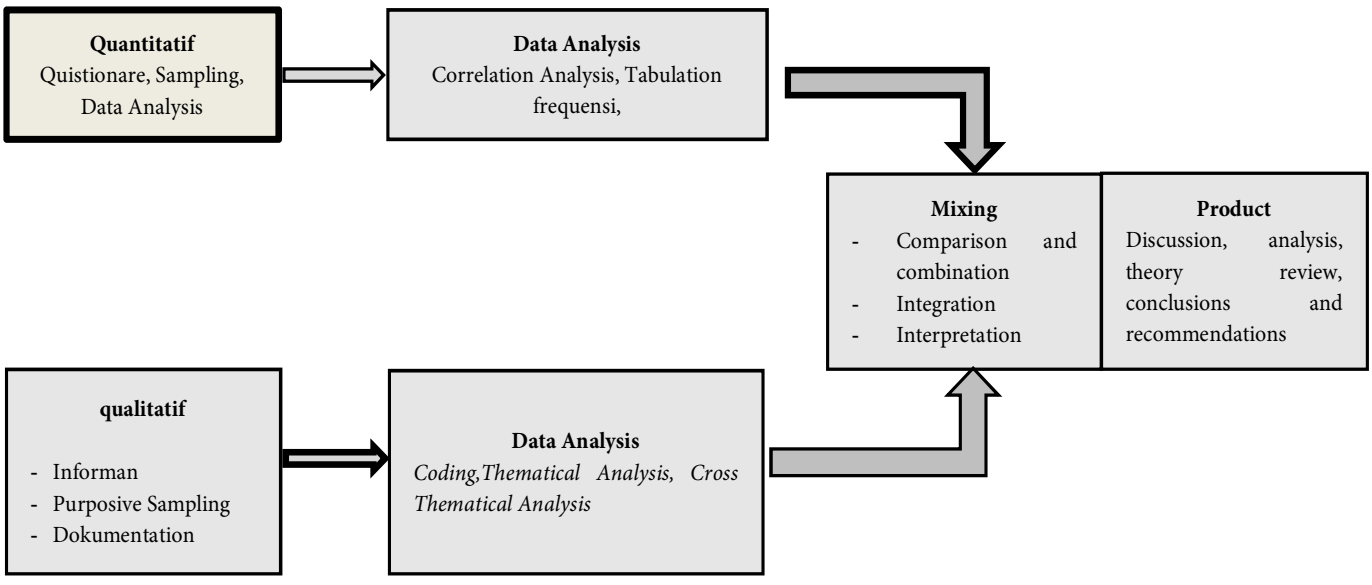

Figure 1. Research design

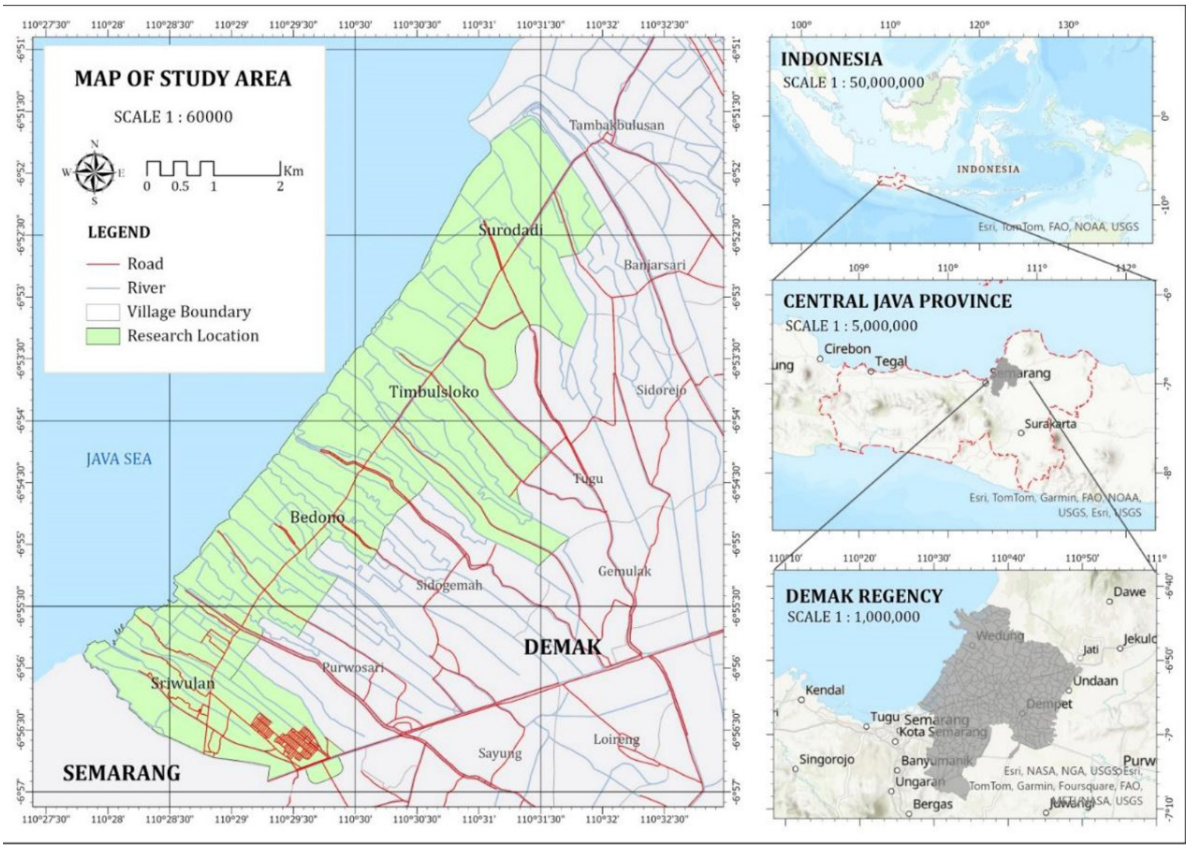

Figure 2. Research Location

Table 1. Demographic and social characteristics of informants

Characteristics	Number of informants	Percentage
Gender		
Male	16	69.57
Female	7	30.43
Marital Status		
Married	7	30.43
Widowed	18	78.26
Age		
31-40 Years	5	21.74
41-50 Years	4	17.39
51-60 Years	9	39.13
61-70 Years	5	21.74
Above 71 Years	0	0
Place of Birth		
Natives	14	60.87
Migrants	9	39.13
Length of Stay		
20-30 Years	6	26.09
30-40 Years	5	21.74
40-50 Years	5	21.74
Above 50 Years	7	30.43
Education Level		
Not Completed Elementary	3	13.04
School	7	30.43
Elementary School	4	17.39
Junior High School	4	17.39
Senior High School	5	21.74
Diploma/Bachelor's Degree		
Occupation		
Related to the Sea	3	13.04
Unrelated to the Sea	20	86.96

(Source: Authors, 2023)

remaining 39.13% were migrants from outside the research location. (5) The length of stay in the research location varies, with 26.09% residing for 20-30 years, 21.74% for 30-40 years, 21.74% for 40-50 years, and 30.43% for over 50 years. (6) In terms of educational backgrounds, 13.04% had not completed elementary school, 30.43% completed elementary school, 17.39% graduated junior high school, 17.39% graduated senior high school, and the remaining 21.74% had a diploma. (7) Occupational diversity was also observed, with 13.04% having occupations related to the sea, while 86.96% have occupations unrelated to the sea.

3. Results and Discussion

Validity and Reliability Tests

Validity and reliability tests were conducted to scrutinize the true significance of the indicator variables in reflecting the latent or construct variables (convergent validity). The examined measures comprise the Standardized Loading Factor (SLF), Construct Reliability (CR), and Average Variance Extracted (AVE). Table 2 provides the values for SLF, CR, and AVE. Table 2 provides the values for SLF, CR, and AVE.

In Table 2, all SLF values of the respective indicators were > 0.5, pointing out that a good nature of convergent validity was achieved in terms of the SLF value. From the validity test based on Average Variance Extracted (AVE) and the reliability one based on Construct Reliability (CR), we could conclude that the AVE value was > 0.5. That was, a good nature of convergent validity based on the AVE value was also attained. In addition, based on the CR value, all CR values were > 0.7, and therefore, a good nature of convergent validity based on the CR value was fulfilled (Hair et al., 2010).

Analysis Results

Following the research method and review procedures, in-depth interview data were carefully transcribed word-by-word. Commencing with open, axial, and selective coding, , the thorough coding process resulted in a comprehensive analysis of the data. Subsequently, theoretical saturation was assessed in order to derive the conceptual model, leading to the development and elaboration of a conclusive theoretical model.

Open Coding

Open coding can simply be defined as the systematic labeling and coding of each segment of collected data. The processes associated this form of coding includes the reduction, refinement, and classification of raw data into conceptual categories pertinent to the research topic. Initially, acquired concepts were organized into categories, transforming samples into concepts. Through the processes of conceptualization and categorization, identical categories as those in the original previous investigation were used in this present research, thereby enhancing refinement and identification of relationships between the categories. In total, 31 concepts and 24 categories were derived through the open coding of 23 cases, with examples of open coding presented in Table 3.

Following the consolidation and reduction process, the initial concepts were streamlined. A total of 32 initial concepts were then organized into 24 distinct categories for clarity and coherence.

Axial Coding

Axial coding serves as a method to interconnect codes through a blend of inductive and deductive reasoning. Method categorizes and abstracts initial concepts into main categories by examining inherent relationships. In accordance with axial coding steps, this research organized the 24 initial categories into 14 main categories, including diarrhea, dysentery, skin issues, furniture damage, vehicle damage, house damage, income reduction, loss of working hours, concerns about increasing tidal floods, concerns about costs, decrease in property value, buyer difficulties, increased travel distance and time, as well as additional costs. The main categories formed from axial coding are provided in Table 4.

Table 2. Average Variance Extracted (AVE) and Construct Reliability (CR) Tests

Indicator	Latent Variable	SLF	SLF^2	Error	CR	AVE
Diarrhea	physical health	0.9279	0.860998	0.1536	0.947	0.857
Dysentery	physical health	0.9288	0.862669	0.1369		
Skin	physical health	0.9308	0.866389	0.1422		
Furniture	property	0.9365	0.877032	0.1238	0.944	0.848
Vehicle	property	0.9018	0.813243	0.2181		
House	property	0.9425	0.888306	0.1202		
Lost time	employment	0.9262	0.857846	0.152	0.915	0.843
Income reduction	employment	0.9195	0.84548	0.1654		
Decrease in property value	property value	0.9416	0.886611	0.1234	0.926	0.862
Buyer difficulties	property value	0.9253	0.85618	0.1563		
Concerns about future floods	mental health	0.9268	0.858958	0.1481	0.923	0.857
Concerns about costs	mental health	0.9323	0.869183	0.1393		
Additional time	mobility	0.9482	0.899083	0.1069	0.926	0.862
Travel distance	mobility	0.9157	0.838506	0.1702		

(Source: Authors, 2023)

Table 3. Open coding

Simple statements	Initial concepts	Initial categories
Frequent bowel movements	Internal body pain	Digestive system pain
Human stool becomes watery		
Experiencing nausea, vomiting, and abdominal pain	Internal body pain	Digestive system pain
Bloody and mucous diarrhea		
Itching on the skin of the feet	External body pain	Skin surface pain
Red spots on the skin surface		
Fungal growth between toe spaces		
Rust formation	Damage to furniture's physical structure	Damage to furniture's physical structure
The shortened lifespan of furniture	Damage to furniture's functionality	Damage to furniture's functionality
Rust on vehicles	Damage to the physical structure of vehicles	Damage to the physical structure of vehicles
Frequent servicing is required	Damage to vehicle's functionality	Damage to vehicle's functionality
Building foundations experience deterioration	Damage to the lower part of the building	Damage to the building's structure
Damage to the house floor		
White spots appearing on the walls	Damage to the upper part of the building	
Rotting of wooden doors and windows		
House yard becomes muddy	Standing water in the house yard	Damage to the house yard
The yard is submerged in tidal water		
Ponds and fields are no longer productive	Damage to production assets	Loss of production assets
Job options become limited	Limited job options	Loss of job types
Standing water prevents the community from working	Operational stoppage in work	Reduced working hours
Standing water in the workplace area		
Returning home from work earlier	Reduced working hours	
Starting work when the floods have receded		
Over time, tidal floods become higher	Tidal flood intensity	Concerns about increasing tidal floods
The receding time of floodwaters becomes longer	Increasing flood duration	
Houses are more frequently flooded	More frequent flood occurrences	
Routine house repairs and elevation	House repairs	Concerns about repair costs
Vehicle and furniture maintenance should be frequent	Vehicle and furniture repairs	
House prices tend to decline	Decrease in house value	Decrease in house value
Unoccupied houses are abandoned by their owners, knowing that selling them would result in a low price		
Land selling prices become low	Decrease in land value	Decrease in land value
Formerly fishpond areas are unsellable	Decrease in pond value	Decrease in pond value
Fishponds integrated with the sea are considered wasteland		
Few are interested in living in tidal flood areas	Lack of interest from people	Buyer difficulties
Advertisements have been running for years with no success	Low bidding values	
Finding an alternative route to the destination	Increasing travel distance	Additional travel distance
Increasing distance to the destination		
Increasing travel time	Increasing travel time	Additional travel time
Waiting for others to cross together by boat	Adjusting departure and return times	
Using a boat to reach the destination	Additional transportation modes	Additional crossing costs
Occasionally renting a boat for the crossing		
The vehicle should be left in storage	Vehicle Storage	Additional storage costs
Motorcycle taxi becomes an alternative if the vehicle cannot reach the destination	Onward transportation	Additional transportation costs
Having to take a detour, thereby increasing fuel consumption	Increased fuel consumption	Additional fuel costs

(Source: Authors, 2023)

Table 4. Main categories formed from axial coding

Initial categories	Main categories
Digestive system pain	Diarrhea
Digestive system pain	Dysentery
Skin surface pain	Skin
Damage to furniture's physical structure	Furniture damage
Damage to furniture's functionality	Vehicle damage
Damage to the physical structure of vehicles	House damage
Damage to vehicle's functionality	Furniture damage
Damage to the building's structure	Vehicle damage
Damage to the house yard	
Production assets cannot be used as an income source	Income reduction
Loss of high-income job types	
Reduced working hours	Loss of working hours
Concerns about increasing tidal floods	Worries about increasing tidal floods
Concerns about repair costs	Concerns about costs
Decrease in house value	Decrease in property value
Decrease in land value	
Decrease in pond value	
Buyer difficulties	Buyer difficulties
Additional travel distance	Travel distance and time
Additional travel time	
Additional crossing costs	Additional costs
Additional storage costs	
Additional transportation costs	
Additional fuel costs	

(Source: Authors, 2023)

Table 5. Core categories formed from selective coding

Main categories	Core categories
Diarrhea	Physical health
Dysentery	
Skin	
Furniture damage	Property damage
Vehicle damage	
House damage	
Income reduction	Employment
Loss of working hours	
Concerns about increasing tidal floods	Mental health
Concerns about costs	
Decrease in property value	Property value
Buyer difficulties	
Distance and travel time	Mobility
Additional costs	

(Source: Authors, 2023)

Selective Coding

Through an exploration of the intrinsic relationships among main categories, selective coding was used to systematically identify and select specific categories to delineate the overarching themes. This research elucidated each sequence of relationships using selective coding steps, with a concentrated emphasis on the narrative flow of the impact of tidal floods on impoverished households. Table 5 presents the main categories formed through selective coding.

From the information presented in Table 5, it can be seen that the main categories encapsulating the impact of tidal floods comprise physical health, property damage, employment, mental health, property value, and mobility. Within physical health, three main categories were identified namely diarrhea, dysentery, and skin issues. Similarly, property damage also comprised three main categories including furniture damage, vehicle damage, and house damage. Employment, on the other hand, housed two main categories namely income reduction and loss of work time. Mental health was also divided into two main categories, concerns about increasing tidal floods and concerns about costs. Furthermore, property value consisted of two main categories namely a decrease in property value

and buyer difficulties. Lastly, mobility also comprised two main categories including increased travel distance and time, as well as additional costs.

Saturation Test

Typically, grounded theory research concludes when data saturation is attained, and ample theories are derived from the data. As stated in previous research, data saturation is broadly recognized when further data processing ceases to contribute significantly to elucidating the investigated phenomenon (Wardhana, 2014). Using Nvivo software, a saturation test for the 23 cases was conducted to evaluate if the theoretical model established earlier had reached theoretical saturation. The results of the saturation test showed that the main categories, initial categories, and the extracted relationships were clear and robust. No new categories or relations were observed after the saturation test, except for an increase in tidal floods, savings ownership, and infrastructure conditions. Accordingly, it is important to comprehend that among the three main categories, no new initial categories arose. Consequently, it can be concluded that the theoretical model showing the impact of tidal floods has reached a saturation point.

Assessment Model for the Impact of Tidal Floods on Poor Households

The coding process included three levels namely open, axial, and selective, and the theoretical saturation test affirmed the saturated nature of the assessment model for the impact of tidal floods. In accordance with the model (Figure 3), it becomes feasible to derive the following fundamental proposition:

Proposition. The proposition asserts that tidal floods had both direct and indirect impacts, which are intricately linked to factors associated with the effects of the natural disaster on impoverished households. Grounded in grounded theory methodology and informed by in-depth interviews, this research thoroughly examined the various factors interconnected with the impact of tidal floods. These impacts include physical health issues, property damage, disruptions in employment, mental health challenges, depreciation in property value, and mobility constraints.

Directly, tidal floods were observed to also impact human health, manifesting in health ailments such as diarrhea, dysentery, and skin irritation upon contact with floodwaters. Furthermore, the disaster tends to damage properties through the deterioration of furniture, vehicles, and houses, leading to a shortened lifespan and necessitating frequent maintenance for sustained functionality, it is also crucial to add that tidal floods disrupt socio-economic activities within the community, precipitating employment disturbances such as loss of working hours and reductions in income.

Beyond the direct impacts, tidal floods were also found to have an indirect influence, particularly on the mental health of the community. This indirect effect is usually manifested in concerns about the potential escalation of future floods, increasing apprehension within the community. Additionally, it leads to sustained anxiety regarding the costs associated with maintenance. The indirect impact of tidal floods extends to the depreciation of property value. Apart from the tangible decrease in value, the community grapples with challenges in finding buyers, as the location loses attractiveness due to the recurring disaster. Furthermore, the disaster indirectly impacts the socio-economic fabric of the community through the existence of mobility problems. Disruptions in roads and bridges lead to increased travel distance and time, coupled with additional costs, and this further increases the socio-economic challenges faced by the affected community.

Based on quantitative and qualitative analyses that tidal floods have impacts on Physical health, property damage, employment, mental health, property value and mobility. As presented in Table 6 and Figure 4, tidal floods had direct impacts on physical health. Flood impacts on physical health were positive in value at a coefficient of 0.8179, a significance p-value of 0.001, and a t-value of 9.7197. The figures explained that bigger tidal floods would likely have a more profound impact on human physical health. In addition, floods would increase the prevalence of diarrhea and fever (Sajid & Bevis, 2021). It was also reported that flood impacts, in general, would disrupt short-term, middle-term, and long-term health (Du et al., 2010).

Direct impacts of tidal floods afflicted properties, which had a positive value at a coefficient of 0.8077, a significance

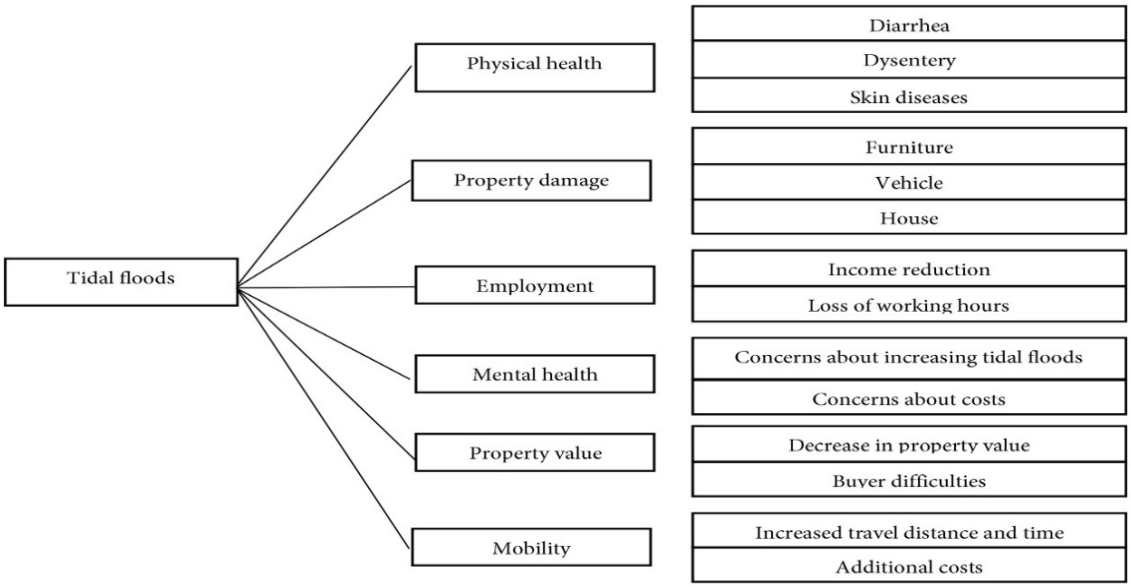

Figure 3. Impact of tidal floods

Table 6 Significance testing

			Estimate	S.E.	C.R.	P	Label
Physical health	<---	Floods	,8179	,0842	9,7197	***	par_1
Property	<---	Floods	,8077	,0786	10,2785	***	par_2
Emplyoment	<---	Floods	,4761	,1223	3,8939	***	par_3
Emplyoment	<---	Physical health	,4061	,1163	3,4932	***	par_4
Mobility	<---	Physical health	,4260	,1205	3,5350	***	par_5
Mental health	<---	Property	,3427	,1177	2,9107	,0036	par_6
Property value	<---	Property	,8276	,0834	9,9178	***	par_7
Mental health	<---	Emplyment	,3079	,1272	2,4207	,0155	par_8
Mobility	<---	Emplyment	,4161	,1255	3,3157	***	par_9
Mental health	<---	Physical health	,2950	,1213	2,4320	,0150	par_10

*** p < 0.001

(Source: Authors, 2023)

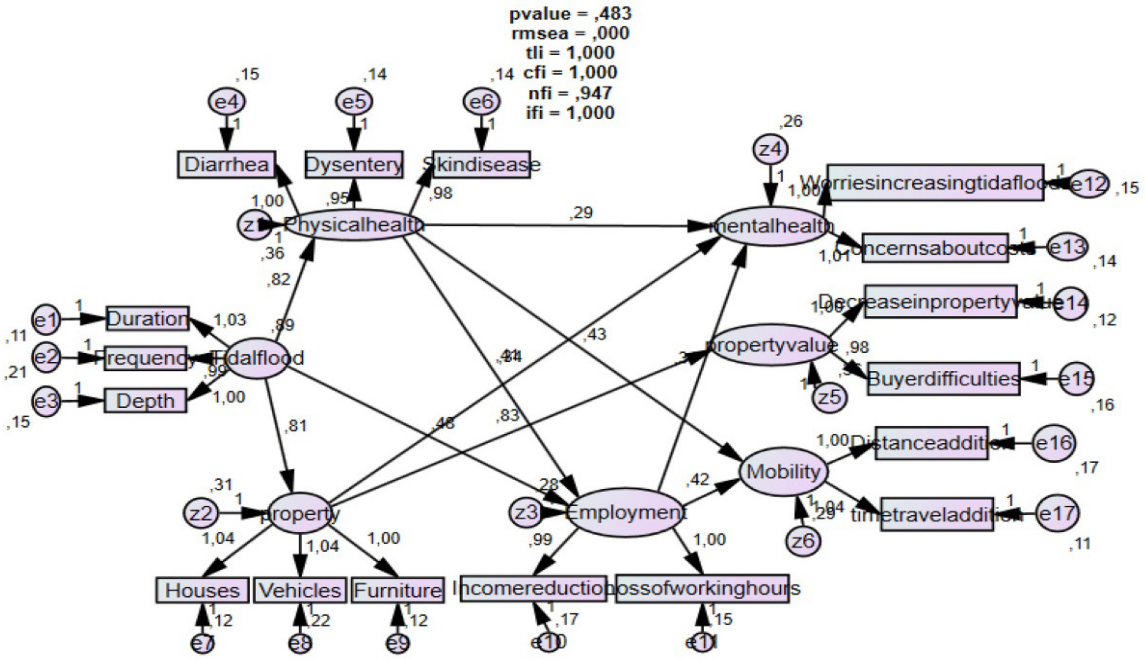

Figure 4. Model Test Results with AMOS
Source: 2023 Data Processing

p-value of 0.001, and a t-value of 10.2785. It expounded that tidal floods with higher intensity would have a more severe impact on property damage, as outlined by the fact that a significant number of houses in the coastal area were damaged by floods (Dube et al., 2022).

Another direct impact of tidal floods was noticeable in employments. Flood impacts on employments came with a positive value at a coefficient of 0.476, a significance p-value of 0.001, and a t-value of 3.8939. It illuminated that bigger tidal floods would have a stronger impact on disruptions to occupations. The finding was consistent with Sultana (2023), who laid out that tidal floods due to changes in coastal areas would significantly affect many different aspects of life, including community livelihoods (Sultana et al., 2023).

Furthermore, indirect impacts of tidal floods were notable in employments as well. Disruptions to employments would likely impact the mental health and mobility of the community. employmental impacts on mental health were positive in value at a coefficient of 0.3079, a significance p-value of 0.001, and a t-value of 2.4207. It illuminated that employments disrupted by floods would have a stronger impact on mental health. employments indirectly affecting mobility had a positive value at a coefficient of 0.4161, a significance p-value of 0.001, and a t-value of 3.3157. The finding set forth that employments disrupted by tidal flood effects would also disrupt community mobility.

Tidal floods also indirectly impacted property, which would impact mental health and the property's values Property damage impacts on mental health had a positive value at a coefficient of 0.3427, a significance p-value of 0.001, and a t-value of 2.9107. It implied that damaged property due to floods would have a more significant impact on mental health. Tidal floods led to increased anxiety, stress, and exhaustion, which accounted for psychological pressures on the community (Husain et al., 2018).

In poor households, disasters aggravated their poverty in the short term and in the long term, lured them into a poverty trap with a slow recovery period (Carter et al., 2007).

The finding shed light on the evidence that tidal floods had direct and indirect impacts, which is in line with the findings of Soetanto and Provebs (2004) (Soetanto & Proverbs, 2004).

Tidal floods direct impacts generated mental health and several diseases (Harthana & Soedirham, 2014; Maibach et al., 2011), such as digestive tract diseases, upper respiratory tract infections, typhoid, skin diseases, and dengue fever. A poor environment with insufficient sanitation would encourage the disposal of liquid and solid wastes in residential areas, contributing to increased water-borne diseases (Manetu & Karanja, 2021). Tidal floods' direct impacts generated various damages to infrastructures (Hakim et al., 2022).. For example, to houses, tidal floods damaged the bottom structure, upper structure, and architecture of the buildings (Ali, 2010). Besides, tidal floods also damaged vehicles (Hino et al., 2019) and household furniture (Rudiarto et al., 2020), not to mention their direct impacts on the socio-economic condition of the community (Jabbar et al., 2023). Due to the floods, community mobility was interfered with because they brought about n distance lengthening, longer time consumption, and increased costs (Debionne et al., 2016). In other words, tidal floods disrupted economic activities, reduced productivity, and scaled up maintenance costs, cutting the community income overall (Hakim et al., 2022).

Tidal floods' indirect impacts were compromising human health. The finding was in accord with Rahman et al. (2022), who spelled out that tidal floods induced severe depression, anxiety, and stress (Rahman et al., 2023). Tidal floods' impacts were also noticeable in reduced property selling values. It was in accordance with Utami et al. (2021), who demonstrated that tidal flood-afflicted land could no longer be drawn on, leading to its disappearance/destruction (Utami et al., 2021). In addition, tidal floods also indirectly impacted socio-economic activities. Asiyah et al. (2015) exhibited that tidal floods had an indirect impact on the social activities of the community (Asiyah et al., 2015).

4. Conclusion and Recommendations

In conclusion, an evaluation of the direct and indirect impacts of tidal floods on the Sayung coast was carried out in this research through a combination of questionnaire guidance and in-depth interviews. Tidal floods have an impacts on Physical health, property damage, employment, mental health, property value and mobility. The obtained results showed that tidal floods had a substantial direct impact on various aspects such as physical health, property, and employment. Tidal flooding is able to influence physical health by 62.32%, flooding can affect employment by 69.59% and flooding can affect property by 65.43%. For indirect impact property is able to influence property value by 62.78%, physical health, property damages and employment can influence mental health by 71.71% and physical health, employment can affect mobility by 66.89%.

Further investigation is warranted to explore the adaptation and coping strategies adopted by the community to mitigate the impact of tidal floods. Additionally, it is equally important to scrutinize the role of the government in addressing the escalating severity of tidal floods.

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