

## EVALUATION OF EFFECTIVENESS OF DISASTER RISK TRANSFER MECHANISMS IN SRI LANKA

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**Abstract:** Disaster risk transfer (DRT) has been identified as a key strategy for managing disaster risks and increasing community resilience. However, the effectiveness of DRT mechanisms is questionable due to natural, socioeconomic, and political factors that may limit their implementation. This study focuses on the case of Batticaloa, Sri Lanka, to examine the implementation and effectiveness of DRT options in reducing disaster risk and enhancing community resilience. The study conducted a case study in three selected GNDs in the Batticaloa district to explore the criteria to assess the effectiveness of disaster risk transfer options. The data was collected through a survey questionnaire and key informant interviews to gather the participants' attitudes and perceptions of DRT mechanisms. The study found that lack of awareness, high costs, and limited coverage were major factors hindering participation in DRT programs. There were also different perspectives among participants on the roles of the government and insurance companies in disaster risk management. The research highlights the importance of enhancing accessibility and affordability of DRT options, and active government involvement in managing disaster risks. It provides a valuable understanding of the local challenges of DRT in Sri Lanka, and recommendations for policymakers and practitioners.

**Keywords:** *Risk, Disaster Risk Transfer, Resilience, Government compensation, Relief*

### 1. Introduction

Disasters have long been a recurring problem throughout human civilization, causing significant losses of life, property, and economic development. The impacts of disasters are increasing due to factors like urbanization, population growth, and climate change, and have far-reaching effects on social and economic development. Floods are a frequent natural disaster in Sri Lanka, causing increasing damage every year despite ineffective disaster risk reduction methods. Therefore, an effective and comprehensive disaster risk management strategy is needed to mitigate these impacts and reduce the financial burden on affected communities.

The need for effective disaster risk management strategies has become more urgent to reduce the vulnerability of communities and mitigate the impacts of natural disasters. Disaster risk management is a multi-faceted approach, and disaster risk transfer (DRT) is a crucial component that involves transferring financial risk from one party to another, which reduces the burden of risk on individuals and communities. DRT has emerged as a crucial strategy for managing disaster risks and increasing communities' resilience. DRT involves transferring the financial burden of disasters from the people or communities affected to external entities like insurance companies or governments. The primary objective of DRT is to provide communities affected by disasters with financial protection, enabling them to recover more quickly and effectively.

Sri Lanka, susceptible to natural disasters such as floods, landslides, and cyclones, continues to suffer significant losses despite efforts by the government and other stakeholders to mitigate their impact. The effectiveness of DRT in enhancing community resilience is uncertain, making it essential to evaluate their impact. With DRT being crucial to reducing disasters' impact, it is necessary to assess DRT's effectiveness, identify areas of improvement, and provide recommendations for developing more effective DRT mechanisms.

In conclusion, the research on the evaluation of the effectiveness of DRT options in Sri Lanka is timely and relevant, given the growing threat of disasters and the need to enhance the resilience of communities. The results of this

research will contribute to the development of effective and sustainable DRT options in Sri Lanka and other disaster-prone regions, which will ultimately lead to a reduction in disaster losses and improve the quality of life of affected communities.

Disaster risk transfer mechanisms in Sri Lanka currently consist of private insurance and government compensation and relief. As a result, it has been informed that the current framework and only minor alignments with the global standard have not been able to effectively manage previous disasters. Coherence, integration, and risk allocation inefficiencies throughout the government's response. The development of data-driven and localized approaches is required (Chandana S.A. Siriwardanaa, November, 2017) Post disaster assessment is necessary for build back better and preparedness. However, the part that is lacking is a proper post-disaster assessment. Additionally, the DMC's DRR measures are either insufficient or absent altogether. The difference is that while rescue and relief operations are satisfactory, rehabilitation and reconstruction efforts are sluggish due to a lack of resources in the post-disaster management process (Chandana S.A. Siriwardanaa, November, 2017). As a result, the effectiveness of the government's post-disaster compensation is in question. With the alignment of global frameworks like Sendai principles, the efficacy of DRT has already been questioned in Sri Lankan context. Additionally, the current studies are national in scope. However, there is no local case study in the existing literature. As a result, there is a research gap that needed to be addressed.

Most risk-transfer mechanisms in Asia currently rely on ad-hoc government assistance, which is unsustainable (Chantarat.S & Paul A. Raschky., February 2020). The lack of opportunities to transfer weather risks may lead livelihood losses, unrecovered property losses hinder efforts for urban poor in developing countries to emerge from poverty (Hohl.R et al., 2020., February ). In most of the developing countries, it has been noted a low insurance culture, where there are more studies required to comprehend the potential avenues of improving the risk transfer mechanisms (Sarmiento.J.P & Torres-Muñoz.A.M., 2020). Additionally, it is worthwhile to study the efficacy of government-based macro-insurance policies and other relief budgets as building measures to increase community resilience. (Chantarat.S & Paul A. Raschky., February 2020). Furthermore, application of risk transfer has been limited by natural, socioeconomic, and political factors that constrain its potential. Hence, identifying such factors with reference to a given local context is very useful for recognizing the local challenges of DRT (Fernández Lopera, 2022). Addressing the above research needs, this study attempts to answer the following research question:

"How effective are flood disaster risk transfer options in reducing flood risk and supporting sustainable development in Sri Lanka?"

### 1.1. RESEARCH OBJECTIVE

- To analyze the status of disaster risk transfer options in Sri Lanka and their level of implementation in the country with reference to case of Batticaloa.
- To evaluate the effectiveness of disaster risk transfer options in terms of their impact on reducing disaster risk and enhancing the resilience of communities with reference to case of Batticaloa.

## 2. Literature Review

The term "disaster risk transfer" describes the process by which individuals or organizations transfer the financial consequences of disasters to a third party, such as an insurance company, the government, or a financial market. The objective of DRT is to reduce the financial losses incurred by individuals and organizations because of natural disasters and to promote sustainable development by managing the monetary losses that occurred because of disasters. The literature review of DRT explores the various methods used to transfer disaster risk, including insurance, catastrophe bonds, and other financial instruments.

In the article (Jerry.R et al., 2006), disaster risk transfer is defined as a process by which the risk of losses due to natural disasters is transferred from vulnerable communities to other actors who have a better ability to manage and absorb the risk. The authors state that DRT options such as index-based insurance can play a crucial role in enhancing microfinance by providing financial protection against natural disasters, reducing the risk of default on loans, and improving access to finance for vulnerable communities. The article highlights the importance of DRT in improving financial resilience and reducing the impacts of natural disasters.

Further risk transfer is defined as "The fundamental idea behind risk transfer is to transfer risk from one party to another" (Holub et al., April 2009). According to this article, disaster risk transfer refers to the transfer of financial risk from vulnerable communities or individuals to a third party, such as an insurance company or other financial institution, to reduce the economic consequences of natural disasters. The authors argue that DRT is a crucial component of comprehensive risk management strategies, as it can provide a financial safety net for communities in the event of a disaster and help to reduce the overall impact of the disaster on communities and their economies. To increase the efficiency of disaster risk management in Austria, the article emphasizes the significance of comprehending the various forms of DRT options as well as the difficulties associated with their implementation.

Traditional disaster risk financing mechanisms such as insurance are not suitable for vulnerable populations who have limited access to financial markets and cannot bear the costs of disaster events. The authors (Sarmiento.J.P & Torres-Muñoz.A.M., 2020) suggest exploring alternative risk transfer mechanisms like microinsurance, community-based risk financing, and public-private partnerships to reduce risk exposure and increase resilience in these populations.

The article discusses microinsurance as a type of low-cost insurance that provides coverage for specific risks, such as those faced by low-income populations living in unstable urban environments. The article (Sarmiento.J.P & Torres-Muñoz.A.M., 2020) highlights how microinsurance can help to lessen the vulnerability of these populations to disasters by providing financial protection and fostering risk awareness and mitigation behaviors.

The article defines community-based risk financing as a type of DRT option (Sarmiento.J.P & Torres-Muñoz.A.M., 2020). It involves the pooling of resources within a community to finance and provide coverage for the risk of loss or damage caused by disasters or other similar events. Community-based risk financing aims to provide insurance protection to people living in precarious urban environments, who are often excluded from traditional insurance markets and are therefore vulnerable to the financial impacts of disasters.

According to the article (Tobias Götze et al., 2021) likely discusses CAT (Catastrophe) bonds as a type of financial instrument used in DRT. CAT bonds are a type of insurance-linked securities that transfer the risk of loss from a catastrophic event from the insurer or reinsurer to capital market investors. The bonds pay a fixed rate of return until a specific disaster or catastrophe occurs, after which the bond issuer is required to make a payment to bondholders.

The use of index insurance as a novel approach to weather insurance intended specifically for low-income countries is the focus of this article (Skees, 2008). The purpose of this innovation is to address the challenges associated with creating weather risk insurance in these nations due to their underdeveloped financial markets. An objective and independent index, like rainfall measurements, is the foundation of index insurance, which uses it as a stand-in for losses to crops, livestock, or other types of property. Annexure 01

Table 1 - Criteria for evaluating DRT's efficacy

Criterion to evaluate the effectiveness of DRT*	Definitions	Measurable indicator/s *
Continuity Criteria	Various aspects of time. (Peijun Shi et al., 2010)	<ul style="list-style-type: none"> <li>• Duration of disaster event</li> <li>• Response time for risk transfer</li> </ul>
Quality	The level of effectiveness and efficiency of DRT in achieving its objectives. (Barbara Sowińska-Świerkosz et al., 2021)	<ul style="list-style-type: none"> <li>• The ability to transfer risk, the cost-effectiveness of the transfer.</li> <li>• The level of coverage provided.</li> <li>• The speed and ease of the transfer process</li> <li>• The degree to which the transfer aligns with the disaster risk management strategies and policies.</li> </ul>
Reliability	The consistency and dependability of the DRT system in providing accurate and timely results. (Tolubko et al., 2019)	<ul style="list-style-type: none"> <li>• Consistency of benefits</li> <li>• Accuracy of benefits</li> </ul>
Risk reduction	The likelihood and potential magnitude of financial-loss or damage that may occur because of a natural disaster. (Tolubko et al., 2019)	<ul style="list-style-type: none"> <li>• The potential severity of losses and damages</li> <li>• The capacity of the community and other stakeholders to respond to and recover from such events.</li> <li>• Improve community ability to recover from future events.</li> </ul>
Affordability	The cost and feasibility of implementing a DRT program, as well as the ability of individuals and communities to pay for it. (Namagembe, 2022)	<ul style="list-style-type: none"> <li>• Community's willingness to pay for DRT mechanism.</li> <li>• Affordability of Insurance premiums</li> </ul>
Adequacy	The extent to which the financial resources available to a country or a community are sufficient to cover the estimated financial costs of a disaster, including the costs of recovery and reconstruction. (Anon., September 2010)	<ul style="list-style-type: none"> <li>• Extent to which the financial resources available to a country</li> <li>• Sufficiency to the country/ the sources of funding available</li> <li>• The timeliness of access to those resources in the event of a disaster</li> </ul>

Accessibility	The ability of individuals or communities to access risk financing solutions easily and conveniently. (J. David Cummins, 2013)	<ul style="list-style-type: none"> <li>• Enrollment process</li> <li>• Eligibility criteria</li> </ul>
Adaptability	The ability of the DRT system to respond, adjust and modify itself to changing risk and environmental conditions, to better serve the needs of the communities it protects. (Paul Hudson et al., 2022)	<ul style="list-style-type: none"> <li>• Adjustability of the coverage depends on the risk changes.</li> </ul>
Transparency	The level of openness and clarity in the design, implementation, and management of index insurance programs. (Skees, 2008)	<ul style="list-style-type: none"> <li>• Awareness of the DRT mechanism</li> </ul>
Localized approaches	Strategies and techniques that are specifically tailored to address the unique risk and vulnerability characteristics of a particular community. (Mechler et al., September 9, 2014)	<ul style="list-style-type: none"> <li>• DRT is specifically tailored to address the local community needs and risks.</li> </ul>
Sustainability	The ability of the DRT mechanism to continue providing its intended benefits over time without incurring undue financial burden or causing harm to the environment or society. (Tobias Götze et al., 2021)	<ul style="list-style-type: none"> <li>• The ability of the DRT to be self-sustaining and operate effectively and efficiently in the long term.</li> <li>• Promoting sustainable development and environmental protection.</li> </ul>

In conclusion, in this study define DRT as “A strategy that uses a variety of financial instruments to shift the financial burden of natural disasters from the affected communities to external entities such as insurance companies, financial sectors and government.” Insurance, microinsurance, community – based risk – financing, public-private partnerships, catastrophe bonds, and index insurance were all found to be global DRT options in this study. The effectiveness of DRT options could be assessed by using continuity criteria, quality, reliability, risk reduction, affordability, adequacy, accessibility, adaptability, transparency, localized approaches, and sustainability criteria. Further research is needed to better understand the impact of DRT on disaster risk management and to develop more effective and efficient methods for transferring disaster risk.

### 3. Research Methodology

The study was conducted through three stages: a review of existing literature, a field survey, and data analysis. The field survey used a questionnaire to assess the community's understanding of risk transfer options and included in-depth interviews with some households. Key informants, such as directors and officers of DMCs, the disaster management officer in the DS office, and private insurance companies, were also interviewed. The collected data was then analyzed to draw conclusion on the effectiveness of the DRT.

The research collected data from fifty (50) individuals through a questionnaire survey. The sample was taken from three GN divisions, with 10 individuals from Nochchimunai GND, 14 from Kallady Uppodai, and 26 from Manmunai North GND. The researcher personally approached each individual and administered the questionnaire, asking the questions and recording their answers. The questionnaire was written in English for academic convenience.

The data collected from the survey questionnaire and key informant interviews were analyzed using both simple descriptive analysis and thematic content analysis. Simple descriptive analysis was used to generate numerical and graphical summaries of the survey questionnaire data, such as frequencies and proportions. In addition, graphical representations such as histograms and bar charts were used to visually represent the data. This type of analysis provided a basic understanding of the characteristics of the sample and the distribution of their responses to the survey questions.

For the qualitative data collected from the key informant interviews and survey questionnaire, thematic content analysis was conducted using NVIVO software. This type of analysis is a widely used method for analyzing qualitative data, which aims to identify and categorize patterns and themes in the data. In this study, the qualitative data was transcribed and coded into meaningful themes, which were then analyzed and interpreted to gain insights into the perceptions and attitudes of the key informants and survey questionnaire towards risk transfer mechanisms in Sri Lanka. The results of the thematic content analysis were then used to complement and further clarify the findings obtained from the simple descriptive analysis.

By using a Likert scale to summarize each criterion and its indicators, the degree of DRT efficiency based on the results can be determined. According to the indicators as well, the Likert scale rated 1 as very low, 2 as low, 3 as moderate, 4 as high, and 5 as very high. The indicators of the criteria were all given equal weights to scale, and the average weight of the indicators was used as a weight for the criteria.

In conclusion, the use of both simple descriptive analysis and thematic content analysis allowed for a thorough and comprehensive analysis of the data collected from the survey questionnaire and understanding of the attitudes and perceptions of the key informants. The results of these analyses provided valuable insights into the awareness, knowledge, and attitudes of the participants towards DRT mechanisms and to support efforts to improve the effectiveness and accessibility of these mechanisms for communities in Sri Lanka. The results of the analysis were used to make recommendations on how to improve the current risk transferring methods in the country.

#### 4. Research Findings

In Sri Lanka, there are various methods of transferring risk associated with natural disasters and other types of risks to manage disaster risks, including insurance and government compensation.

In Sri Lanka, both public and private insurance companies offer various insurance products that cover natural disaster risks such as floods, hurricanes, and earthquakes. Insurance policies offer financial compensation to policyholders, but coverage and premiums vary depending on the individual's needs and type of risk. However, due to low awareness and lack of clarity about policies, many people in Sri Lanka are not interested in purchasing insurance. The study (Roshini Rambukwella et al., 2020) evaluates the implementation and outcomes of the Weather index-based insurance scheme in Sri Lanka, which offers coverage for crop losses caused by extreme weather events, with a focus on factors such as uptake, claims processing, and overall effectiveness. The insurance provides coverage based on pre-agreed weather indices rather than actual loss assessments.

The Sri Lankan government transfers risk through disaster risk reduction and management programs, including financial assistance, grants, and reliefs for communities affected by disasters, as well as disaster risk reduction measures. However, the compensation process is unclear, lacking transparency, and difficult to access for individuals. The article (Eddy Van Doorslaer et al., 2007) examines how catastrophic risk insurance can improve Sri Lanka's resilience to natural disasters by transferring large losses from the government to the private sector. The report analyzes the current state of catastrophic health insurance coverage, including availability, uptake, and its effectiveness in reducing the financial burden of catastrophic health expenses on households.

Community-based risk financing mechanisms (Mechler et al., September 9, 2014) can help provide financial protection to communities from disasters, by collectively contributing funds in advance and managing them with the help of a trusted third party. This approach aims to ensure that resources are available when needed and are distributed transparently and fairly and reduce their dependence on external aid.

Sri Lanka has non-financial risk transfer methods such as disaster risk reduction measures including improving evacuation plans and educating the public about disaster preparedness. The government's compensation is the only DRT mechanism available in Batticaloa, and most people who don't know much about insurance rely solely on it, even though private insurance companies offer disaster coverage. To ensure long-term sustainability, the government and stakeholders should continue developing and implementing effective risk transferring methods.

Criteria identified to determine the efficiency of the DRT is analyzed according to its indicators. Reviewing the discussion, the degree of DRT effectiveness based on each criterion can be determined by summarizing each criterion and its indicators using a Likert scale. The following table represents the efficiency of each criterion.

Table 2: Assessment of effectiveness

CRITERI	Measurable indicator/s *	1	2	3	4	5	EFFICIENCY SCALE	Overa ll Scale
Continuity Criteria	Duration of disaster event	Significantly has increased	Slightly increased	No change	Slightly decreased	Significantly decreased	3	3
	Response time for risk transfer	More than a month	Within a month	Within a day	Within 12 hours	Immediately	3	
Quality	The cost-effectiveness of the transfer.	Small part of the damage covered	Less than half of the damage covered	Half of the damage covered	More than half of the damage covered	Full damage covered	5	3.4

	The level of coverage provided.	Small part of the damage	Less than half of the damage	Half of the damage	More than half of the damage	Equal to the damage	5	
	The speed of transfer	Within 6 months	Within 3 months	Within a month	Within 2 weeks	Within a week	3	
	The ease of the transfer process	Extremely difficult	Difficult	Neutral	Easy	Very Easy	2	
	The degree to which the transfer aligns with the disaster risk management strategies and policies	Less than 10% aligns with the policies	25% aligns with the policies	50% aligns with the policies	75% aligns with the policies	100% aligns with the policies	2	
Reliability	Consistency of benefits	No benefits	Less than previous amount	Equal to the previous amount	More than previous amount but not equal to the damage	Equal to the damage	5	4
	Accuracy of benefits	Estimation is less than 10% accurate	Estimation is 25% accurate	Estimation is 50% accurate	Estimation is 75% accurate	Estimation is 100% accurate	3	
Risk reduction	The potential severity of losses and damages	Community's resilience is exceptionally low	Community's resilience is low	Community's resilience is moderate	Community's resilience is high	Community's resilience is extremely high	1	1
	The capacity of the community and other stakeholders to respond to and recover from such events.	Exceptionally low connection between community and stake holders	Low connection between community and stake holders	Moderate connection between community and stake holders	High connection between community and stake holders	Extremely high connection between community and stake holders	1	
	Improve community ability to recover from future events.	Exceptionally low community incorporation	Low community incorporation	Moderate community incorporation	High community incorporation	Extremely high community incorporation	1	
Affordability	Community's willingness to pay for DRT mechanism.	Exceptionally low willingness	Low willingness	Moderate willingness	High willingness	Extremely high willingness	1	1
	Affordability of Insurance premiums	Extremely high premium	Very premium	Moderate premium	Low premium	Exceptionally low premium	1	
Adequacy	Extent to which the financial resources available to a country	Insufficient	Marginally sufficient	Sufficient	Very sufficient	Extremely sufficient	1	2.333
	Sufficiency to the country/ the sources of funding available	Insufficient	Marginally sufficient	Sufficient	Very sufficient	Extremely sufficient	2	
	The timeliness of access to those resources in	Not timely	Minimally timely	Timely	Very timely	Exceptionally timely	4	

	the event of a disaster							
Accessibility	Enrollment process	Extremely difficult	Difficult	Neutral	Easy	Very Easy	1	1
	Eligibility criteria	Extremely restrictive	Restrictive	Neutral	Inclusive	Extremely inclusive	1	
Adaptability	Adjustability of the coverage depends on the risk changes.	Not adjustable	Somewhat adjustable	Adjustable to a limited extent	Highly adjustable	Completely adjustable	1	1
Transparency	Awareness of the DRT mechanism	Completely unaware	Slightly aware	Moderately aware	Highly aware	Extremely aware	1	1
Localized approaches	DRT is specifically tailored to address the local community needs and risks.	Not addressing	Somewhat addressing	Moderately addressing	Highly addressing	Completely addressing	1	1
Sustainability	The ability of the DRT to be self-sustaining and operate effectively and efficiently in the long term.	Not at all able	Somewhat able	Moderately able	Highly able	Extremely able	2	2
	Promoting sustainable development and environmental protection.	Not at all promoting	Slightly promoting	Moderately promoting	Considerably promoting	Strongly promoting	2	

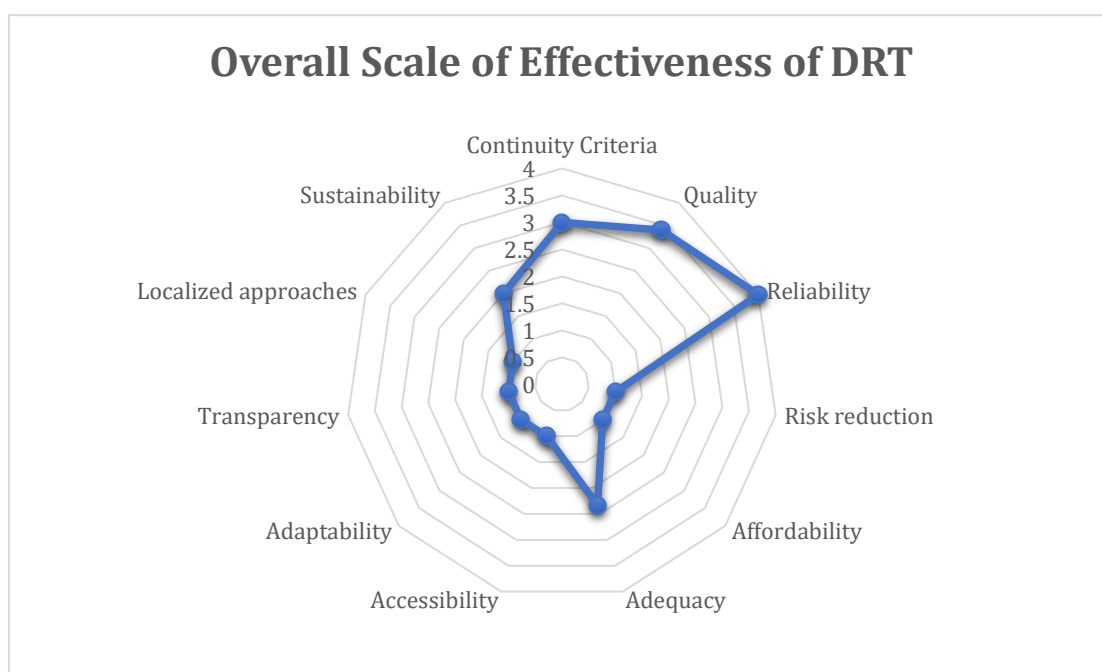


Figure 1: Effectiveness of DRT indicators

Taking into consideration figure, combining the 11 criteria to determine DRT's effectiveness. In terms of effectiveness, criteria like adequacy, reliability, and quality receive significant weight.

However, considering quality criteria, the transfer's cost-effectiveness and coverage level are satisfactory. However, there is a significant issue with the transfer's speed, ease, and alignment with disaster risk management strategies and policies.

Considered as a whole, reliability is very good. Reliability requirements meets to a significant degree.

The speed with which those resources can be accessed in the event of a disaster is satisfactory in terms of adequacy. However, the extent to which a nation's financial resources are adequate and the availability of sufficient funding are extremely poor.

However, continuity criteria, risk reduction, affordability, accessibility, adaptability, transparency, localized approaches, and sustainability are of lesser importance and require enhancements.

The survey questionnaire and key informant interviews provided a comprehensive understanding of participants' attitudes and perceptions regarding DRT mechanisms in Sri Lanka. The distribution of participants' enrollment in DRT programs and the frequency with which participants were aware of DRT options were both revealed by the straightforward descriptive analysis of the data. Most participants had little knowledge of DRT mechanisms and the options that were available, and more than 80% were not enrolled in any DRT programs.

These findings were further developed by the thematic content analysis, which shed light on the factors that led participants to enroll in DRT programs despite their lack of knowledge. According to the analysis, the main reasons people didn't sign up for DRT programs were the high costs and lack of coverage provided by these mechanisms. The participants voiced their concerns regarding the limited coverage provided for the money spent and the high enrollment costs for DRT programs. This suggests that DRT options in Sri Lanka need to be made more accessible and less expensive.

Participants' reliance on personal experience and word-of-mouth shows that their sources of information influenced their awareness and knowledge of DRT mechanisms, highlighting the need for improved education and awareness campaigns to encourage more people to enroll in these programs and understand the benefits, particularly in high-risk flood areas.

Additionally, the findings demonstrated that participants' perspectives on the roles that insurance companies and the government play in disaster risk management varied. While others are unaware of the other options that are available to them, few participants expressed the opinion that the government ought to take a more active role in lowering the risk of flooding and supporting sustainable development. Considering insurance, individuals are unaware of the disaster insurance options in the country.

Results obtained from the key informant interviews (Disaster Management Officer, Manmunai North, Batticaloa.)



Figure 2: Word cloud obtained from DMC officer

Results obtained from the key informant interviews (NDRSC Officer, DMC, Batticaloa.)





Figure 3: Word cloud obtained from NDRSC officer

## 5. Conclusion & Recommendations

In conclusion, the objective of the study is to assess the status and effectiveness of DRT options in Sri Lanka, with a focus on the Batticaloa case. The study aims to evaluate the effectiveness of these options on reducing disaster risk and enhancing community resilience.

The analysis's findings shed light on the participants' awareness, knowledge, and attitudes regarding DRT mechanisms. According to the findings, there is a general lack of awareness and knowledge regarding DRT mechanisms in Sri Lanka. The findings also revealed that a lack of public participation, understanding, and awareness impedes the implementation of DRT programs. In addition, the findings demonstrated that a most of the respondents had never participated in any DRT programs, indicating the need for enhanced outreach and communication efforts. Based on the findings of the research, it is suggested that efforts are made to improve the current risk transfer methods in Sri Lanka. This can be accomplished through educational and outreach programs that raise public awareness of and understanding of DRT mechanisms. Additionally, it is suggested that the government and other relevant organizations work to improve DRT options for communities more readily available and less expensive. This study has limitations as it focuses only on the Batticaloa case study in Sri Lanka due to language and accessibility barriers. The coverage of disasters in household insurance by private insurance companies is limited. Also, the government and insurance companies are not providing detailed information about the affected populations and those who have disaster coverage, as the research is for academic purposes.

Recommendations can be made on how to raise awareness of and educate people about DRT options, improve the accessibility and affordability of these mechanisms, the potential role of insurance companies in DRT, including the barriers and incentives for insurance companies to participate in this process, to better understand the attitudes and perceptions of communities towards DRT mechanisms and to explore the most effective ways to engage communities in the risk transfer process, and identifying in alternative risk transfer mechanisms that better meet the requirements of Sri Lankan communities. Additionally, the findings have the potential to contribute to efforts to enhance communities' resilience to flood disasters and inform future research on DRT in the nation.

In conclusion, the research sheds light on the difficulties and opportunities for enhancing Sri Lanka's DRT mechanisms. Policy and decision-making for reducing disaster risk can be influenced by these insights, as can efforts to build communities in the country a more resilient and sustainable future.

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## Annexure 01: Criteria of Effectiveness of DRT

1. **Continuity:** It refers to various aspects of time such as the duration of the disaster event, the response time for risk transfer, or the time frame for assessing risk (Peijun Shi et al., 2010).  
Continuity criteria in DRT refers to the measures and standards that ensure the DRT mechanism can continue to operate effectively and efficiently, even during or after a disaster. These criteria include factors such as duration of disaster and response time for risk transfer. The continuity criteria in DRT helps to ensure that the DRT mechanism can provide timely and effective support to affected communities during and after disasters, and that it can continue to do so over the long term. The duration of a disaster event is one of the factors considered in continuity criteria in DRT. The length of the disaster and its impact on the community can determine the amount and type of resources needed to support recovery efforts. Continuity criteria in DRT assess the ability of the system to provide essential services and support during and after a disaster event, regardless of its duration.  
The response time for risk transfer in DRT refers to the amount of time it takes for the DRT mechanism to activate and provide financial compensation or support to those affected by a disaster. This is an important factor to consider as the quicker the response time, the faster the impacted individuals and communities can start to recover and rebuild. An efficient and effective response time can help to minimize the financial losses and economic impacts of a disaster.
2. **Quality:** The quality of Disaster Risk Transfer (DRT) according to the article (Peijun Shi et al., 2010) refers to the level of effectiveness and efficiency of DRT in achieving its objectives. The quality of DRT can be evaluated based on various factors such as the ability to transfer risk, the cost-effectiveness of the transfer, the level of coverage provided, the speed and ease of the transfer process, and the degree to which the transfer aligns with the disaster risk management strategies and policies of the affected community. The study aims to provide a comprehensive evaluation of the quality of DRT options available to inform decision-making and improve disaster risk management outcomes.  
Prior to considering the quality of the effectiveness criteria, the ability to transfer risk in a disaster situation is taken into consideration. The damage coverage on the circular is the primary consideration when weighing the cost-effectiveness of transfer. The level of coverage for the damage is focused when a disaster damages a house. Determining the extent to which individuals are effectively receiving compensation for damages by measuring the ratio of the compensation received for damages to the actual cost of the damage.
3. **Reliability:** Reliability of Disaster Risk Transfer (DRT) refers to the consistency and dependability of the DRT system in providing accurate and timely results. According to the article (Tolubko et al., 2019) the reliability of DRT is an important factor to consider in evaluating the effectiveness of the system. The reliability of DRT should ensure that the DRT system provides consistent and dependable results, without any significant errors or failures, so that it can be relied upon to make accurate and informed decisions in the event of a disaster.  
The reliability is the subsequent criterion for determining the effectiveness. A DRT system that can be relied upon to function as intended and provide the anticipated benefits to those who require them without excessive delay or interfering is known as a reliable DRT system. Because it aids in ensuring that individuals and communities are able to recover quickly and effectively following a disaster, a dependable DRT system is essential for lowering the risk of disaster and enhancing resilience.  
The stability of the assistance provided to the affected community in each disaster is taken into account in light of the consistency of the benefits. Reliability and consistency of benefits in Disaster Risk Transfer (DRT) refer to the dependability and uniformity of the financial compensation received by the disaster – affected communities or individuals. In order to assist the affected communities in recovering from the losses and damages caused by the disaster, it is essential that the DRT mechanisms offer benefits to them that are predictable and consistent. The reliability and consistency of benefits are also important in ensuring that DRT mechanisms are effective in reducing the overall financial burden of disasters and promoting resilience and risk reduction.  
The degree to which the benefits provided by Disaster Risk Transfer (DRT) programs correspond to the actual needs and losses incurred by the affected individuals and communities is referred to as the accuracy of benefits in DRT. It is important to ensure accuracy of benefits in DRT to ensure that the programs are effective and beneficial to the target beneficiaries. High accuracy of benefits in DRT can improve the resilience of communities and reduce their risk to disasters, as well as increase their confidence in the DRT programs and their willingness to participate.
4. **Risk Reduction:** The risk of DRT refers to the likelihood and potential magnitude of financial loss or damage that may occur as a result of a natural disaster. According to article (Tolubko et al., 2019), the risk of DRT is one of the key criteria used to assess the effectiveness of a decision support system for managing and reducing disaster risk. This includes considering factors such as the likelihood of natural disasters occurring, the potential severity of losses and damages, and the capacity of the community and other stakeholders to respond to and recover from such events. The goal is to evaluate the potential risk and evaluate the best possible ways to mitigate and manage it.  
One of the indicators used to evaluate the effectiveness of risk reduction in DRT is the potential severity of losses and damages. The potential severity of losses and damages in DRT refers to the extent of financial losses that could occur as a result of a natural disaster event, if no risk transfer mechanism was in place. By transferring the financial consequences of natural disasters to specialized entities with the capacity to absorb and manage the risk, DRT aims to lessen the potential severity of losses and damages. This helps to protect individuals, organizations, and communities from the financial impact of natural disasters, thereby reducing their exposure to financial risk. By transferring the risk, DRT provides a mechanism for communities to access resources and support in the aftermath of a disaster event, enabling them to quickly recover and rebuild. This enhances communities' resilience to future disasters and helps to reduce the long-term economic and social impacts of natural disasters.
5. **Affordability:** Studies have shown that affordability is a key consideration when designing and implementing risk transfer mechanisms. The affordability of Disaster Risk Transfer (DRT) refers to the cost and feasibility of implementing a DRT program, as well as the ability of individuals and communities to pay for it. According to the report (Paul Hudson et al., 2022)

the affordability of DRT is one of the critical factors that must be considered when evaluating the effectiveness of DRT programs and initiatives. This criterion assesses the economic impact of DRT on individuals, households, and communities, including the cost of insurance premiums, deductibles, and other related expenses. Factors that can influence the affordability of DRT include household income, existing financial resources, and the availability of affordable insurance products.

Affordability refers to the cost of acquiring disaster risk transfer (DRT) options, such as insurance or compensation, which is manageable and accessible to the community. In the context of DRT, affordability is a crucial factor, as people with lower incomes may not be able to afford to buy insurance or participate in compensation schemes. For DRT to be effective, it must be affordable to a wide range of people, including those in vulnerable communities, to ensure that they are protected against financial losses and damages caused by disasters. Factors that can impact the affordability of DRT options include the cost of premiums, the level of coverage offered, and the accessibility of financing options for those who need it.

6. **Adequacy:** Studies have emphasized the importance of providing adequate coverage when it comes to risk transfer mechanisms, including assessing the potential losses or damages caused by a disaster and ensuring that the coverage provided is sufficient to help people recover from the financial impact of a disaster. Adequacy in disaster risk financing refers to the extent to which the financial resources available to a country or a community are sufficient to cover the estimated financial costs of a disaster, including the costs of recovery and reconstruction. According to article (Bank), adequacy of disaster risk financing can be assessed by analyzing the size of financial resources compared to the potential costs of a disaster, the sources of funding available, and the timeliness of access to those resources in the event of a disaster. Adequacy of disaster risk financing is an important factor to consider as it affects a country or community's ability to respond to and recover from disasters and contributes to the overall resilience of the system.

Adequacy in DRT refers to the extent to which the financial resources, coverage, benefits, and payments provided by the disaster risk transfer mechanism meet the needs and expectations of the communities being served. In the context of disaster risk transfer (DRT), the adequacy of financial resources refers to the ability of the DRT mechanism to provide sufficient financial support to affected communities in the aftermath of a disaster. It is a measure of the effectiveness and relevance of the DRT mechanism in addressing the disaster risk faced by the community. Adequacy is influenced by factors such as the level of risk, the cost of the premium, the availability of coverage, and the responsiveness of the DRT mechanism to the needs of the community. If the DRT mechanism is considered adequate, it means that the community is satisfied with the level of protection provided by the mechanism, and that they feel secure and protected against the impacts of disasters.

7. **Accessibility:** Studies have highlighted the importance of accessibility when it comes to risk transfer mechanisms, including making the program easily available to the population or community at risk, and ensuring that the enrollment process is simple and straightforward (J. David Cummins, 2013). According to the article, accessibility refers to the ability of individuals or communities to access risk financing solutions easily and conveniently. This includes not only the availability of products or services in each area, but also the ability of individuals to understand and participate in these programs, as well as the feasibility of accessing financial services and payment mechanisms. The article suggests that increasing accessibility can help to increase uptake and ensure that risk financing programs reach those who need them most, particularly in developing countries where access to financial services can be limited.

Accessibility in Disaster Risk Transfer (DRT) refers to the ease of availability and reachability of DRT mechanisms to the intended beneficiaries, particularly vulnerable communities. This includes access to information, resources, and services necessary to avail the benefits offered by the DRT mechanism. Factors that affect accessibility include geographic location, language barriers, technological infrastructure, and financial capacity. Ensuring accessibility is crucial to increase the uptake and effectiveness of DRT mechanisms in reducing disaster risk and promoting resilience.

8. **Adaptability:** Studies have highlighted the importance of adaptability when it comes to risk transfer mechanisms, including adjusting the coverage provided as the risk changes and ensuring that the program can respond to the changing needs of the population or community at risk. The adaptability of DRT according to article (Paul Hudson et al., 2022) refers to the ability of the DRT system to respond, adjust and modify itself to changing risk and environmental conditions, to better serve the needs of the communities it protects. This includes the ability to accommodate new risks, new technologies, new regulations, and changing societal values. In the context of the role of risk transfer and spatial planning for enhancing the flood resilience of cities, adaptability of DRT is considered as a key factor in improving the overall resilience of communities facing flood risks. Adaptability in Disaster Risk Transfer (DRT) refers to the ability of the DRT mechanism to adjust and respond to changing needs, risks, and circumstances over time. This is essential to ensure that DRT remains relevant and effective in reducing disaster risk and promoting resilience in communities. An adaptable DRT mechanism should be flexible enough to accommodate new information and developments in disaster risk reduction and to adjust its strategies and interventions as necessary. This can help to ensure that the DRT mechanism remains effective and relevant in addressing the evolving needs and risks of the local community over time.

The adaptability of DRT allows for the coverage to be adjusted based on changes in the risk of natural disasters, such as increasing frequency or intensity of events. This helps to ensure that the coverage provided by DRT remains relevant and effective in addressing the needs and risks faced by the local community. By incorporating measures of adjustability, DRT helps to ensure that communities have the necessary protection in place to recover from future disasters and to address the impacts of changes in the risk environment.

9. **Transparency:** Studies have emphasized the importance of transparency when it comes to risk transfer mechanisms, including providing clear and easy-to-understand information about the program and ensuring that the terms and conditions are simple and straightforward. According to the article, transparency refers to the level of openness and clarity in the design, implementation, and management of index insurance programs (Skees, 2008). This includes aspects such as clearly explaining the terms and conditions of the insurance coverage, providing understandable information on the claims process, and ensuring that customers understand the basis for premium calculations and payouts. Transparency is seen as an important factor in building trust among customers and promoting the uptake and sustainability of index insurance programs, particularly in lower-income countries where insurance literacy levels may be low. The article likely discusses the challenges and opportunities associated with promoting transparency in index insurance programs and provides recommendations for how to increase transparency in practice.

Transparency in DRT (Disaster Risk Transfer) refers to the level of openness and accountability in the design, implementation, and evaluation of DRT mechanisms. Awareness of DRT mechanisms is a crucial factor in ensuring transparency in DRT. If the community is not aware of the DRT mechanisms available, they will not be able to take advantage of them, and the DRT mechanisms will not be effective. Hence, awareness-raising and education about DRT mechanisms is important for increasing transparency in DRT.

10. **Localized Approaches:** The localized approaches of Disaster Risk Transfer (DRT) refer to strategies and techniques that are specifically tailored to address the unique risk and vulnerability characteristics of a particular community. This approach takes into consideration the specific social, economic, and environmental factors of the community and the local context in which they exist. According to the paper (Mechler et al., September 9, 2014), localized approaches of DRT are considered as an important tool in enhancing the resilience of communities to flood risks, by ensuring that the DRT solutions are relevant, effective, and sustainable in the long run.  
DRT is specifically tailored to address the local community needs and risks suggests that DRT mechanisms are designed to cater to the unique needs and risks faced by different communities, based on their local characteristics and conditions, which helps to ensure that the financial resources and tools used to address disaster risk are appropriate for the context and effective in reducing the potential for losses and damages. This localized approach recognizes that disaster risk and resilience factors vary widely between different communities and regions, and therefore, a one-size-fits-all approach is unlikely to be effective. By focusing on the local context, localized approaches in DRT aim to provide more targeted and effective solutions that are tailored to the needs of the community and can better address their specific risk and resilience factors.
11. **Sustainability:** The concept of sustainability of DRT according to the article " (Tobias Götze et al., 2021) refers to the ability of the DRT mechanism to continue providing its intended benefits over time without incurring undue financial burden or causing harm to the environment or society. In other words, it is the ability of the DRT to be self-sustaining and operate effectively and efficiently in the long term while also promoting sustainable development and environmental protection.  
Sustainability in DRT refers to the ability of a DRT mechanism, to persist and continue providing benefits over time, regardless of changes in the environment, economy, or political landscape. This includes factors such as the availability of financial resources, the resilience of the underlying infrastructure and institutions, the ability to adjust coverage based on changing risk levels, and the willingness of stakeholders to participate in and support the DRT mechanism. Ensuring the sustainability of DRT mechanisms is important for reducing the overall impact of disasters and improving the ability of communities to recover from future events.

In conclusion, the literature review of DRT suggests that it can play a crucial role in reducing the financial losses incurred by individuals and organizations as a result of natural disasters. The effectiveness of DRT depends on several factors, including the availability and cost of insurance, the structure of catastrophe bonds, and the level of community engagement. Further research is needed to better understand the impact of DRT on disaster risk management and to develop more effective and efficient methods for transferring disaster risk.