



Applying Multiple Deprivation Index in Thailand: Concept and Measurement

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Abstract

Many of the Sustainable Development Goals (SDGs) aim to achieve equity and inclusivity, regardless of gender, socioeconomic status, or living conditions, to improve people's lives. In advanced economies, indices monitoring social equity, such as the Index of Multiple Deprivation (IMD), are being developed. The index provides serial policy-oriented pictures through domains of income, employment, education, health, housing, and environment disparities. This article describes concepts underlying the developments of the index to monitor improvements of justice in society through the mentioned domains. The article further examines measurement methods, and feasibility of data sources for calculating or updating the index for future use. The current study suggests that IMD in Thailand could be compiled at the district level, covering a larger area than was originally developed. Importantly, other data sectors allow for the future development of smaller area interventions.

Keywords: Index of Multiple Deprivation, Thailand, Concept, Measurement, Sustainable Development Goals (SDGs)

Introduction

The Sustainable Development Goals (SDGs) are the global community's collective aims (17 goals) to eradicate poverty, protect the planet, and strive to ensure humanity's happiness by 2030 (Sachs, 2012; UNDP, n.d.; 2017). These goals reflect different dimensions of the social problem. In a society where "Human beings vary in health as they do in other attributes" (Whitehead, 1991), health disparities are resulted from numerous overlapping societal factors. The SDGs aim to address those inequalities whether they are gender, socio-economic status, or other factors.

The 17 SDGs can be categorized using the 5Ps framework. 'People' includes goals related to human well-being like no poverty and good health. 'Prosperity' touches on economic aims such as zero hunger, while 'Planet', 'Peace', and 'Partnership' represent environmental, societal, and collaborative objectives respectively. This structured classification offers a clearer perspective on the SDGs, aligning them with broader developmental themes and diverse indicators of inequality, often referred to as deprivation. Such groupings have informed the development of indices like the composite index of multiple deprivation in various countries, including England (Payne & Abel, 2012), Scotland (Kearns et al., 2000), and Wales (Nolan, 2016).

The Index of Multiple Deprivation (IMD) is a concept that examines a country's overall picture of disadvantage and presents it at a Small Area level (Niggebrugge et al., 2005; Noble et al., 2006), which is an area with a small size of population (Noble et al., 2000). The IMD offers an insightful perspective on national disadvantages, especially when viewed at the Small Area level. This granular approach is instrumental in pinpointing specific areas and dimensions that require the most support. Thailand's evolving challenges, including urban-rural divides and socio-economic imbalances, underscore the significance of the IMD. With its small area analysis advantage, the IMD becomes a pivotal tool for Thailand, facilitating a targeted approach to its multifaceted social issues. These challenges are also mapped according to the IMD domains, ensuring a direct alignment with the objectives of the SDGs.



In this article, an initial attempt is made to develop the Index of Multiple Deprivation in Thailand to be applied in a policy-oriented way in area-based development. Such development will lead to goal-oriented policymaking and align with the targets of the Sustainable Development Goals.

Background of Index of Multiple Deprivation

The origin of the multiple deprivation index started in 1979 when Townsend attempted to define the term “poverty” in the context of the United Kingdom (McLennan et al., 2011; Townsend, 1979). The definition specified by Townsend is “persons, families, and groups of persons can be said to be in poverty if they lack the resources to obtain the types of diet, participate in the activities, and have the living conditions and amenities which are customary, or are at least widely encouraged or approved, in the society in which they live”. Later, the terms “poverty” and “deprivation” were commonly used, marking the beginning of the use of the term “deprivation”.

The Index of Multiple Deprivation (IMD) can be divided into two broad concepts, one using data from population surveys as its data base, and the other using non-population survey-based data. The index measures the level of deprivation, with the first index being the Underprivileged Area score: UPA 8, introduced by Brian Jarman in 1983 and published in the British Medical Journal under the title “Identification of underprivileged areas” (Jarman, 1983). The concept of UPA 8, also known as the Jarman index, is based on the measurement of deprivation at a small area level.

Later, the Acheson committee’s desire for evidence-based strategies to maximize primary care services in areas of difficulty (Carr-Hill et al., 2005), a survey was conducted of 100 primary care clinics in London, asking about the types and characteristics of services and socioeconomic factors that have the greatest impact on their workloads. A random sample of 1 in 10 of each clinic was sent a prioritization questionnaire asking to rank the importance of 13 social factors, such as unemployment, housing conditions, single parenthood, and 8 medical service factors, such as waiting time for service, household budget costs associated with medical care. This is considered another starting point in the use of socio-economic factors such as deprivation measuring.

In 1988, sociologist Peter Townsend created the Townsend index to measure material deprivation (Townsend, 1987a; 1987b). The index was based on four indicators: 1) unemployment rate, 2) non-car ownership, 3) non-home ownership, and 4) household crowding. The Townsend index has become very popular in the study of disease and death rates among different population groups and has even used means-tested benefit data. Townsend used this index to analyze health inequalities in the north of England (Carr-Hill et al., 2005).

After that, in 1993 Gordon and Forest presented the Matdep and Socdep indices (Gordon, 2003; Testi et al., 2011) which presented the two-dimensional measure of material and social deprivation. The work of both attempted to reflect the difference between material and social deprivation clearly and differed from the Townsend Index by highlighting material deprivation but still had similar measures and calculation methods to the Townsend Index. In the case of the Socdep Index, it attempted to give attention to social need based on survey data of the population to serve as a basis for decision-making by local organizations.

In 2000, the UK’s Ministry of Housing, Communities and Local Government created the Index of Multiple Deprivation, a multi-dimensional index known as The Index of Multiple Deprivation 2000 (McLennan et al., 2019; Smith et al., 2015). It measures various dimensions of deprivation, such as education, income, and access to health services, each of which can be measured separately. The IMD has been updated five times (Lloyd et al., 2023), IMD 2000, IMD 2004, and IMD 2007, with the Department for Communities and Local Government



giving the Social Disadvantage Research Centre of the Social Policy and Social Work department of Oxford University responsibility for updating the index. The index was later updated again with IMD 2010, IMD 2015, IMD 2019, and IMD 2022.

Besides the Index Multiple Deprivation, there are other indexes such as the Scotland Deprivation Index (Scotdep) (Kearns et al., 2000; Morris & Carstairs, 1991), indexes that do not use population survey data as a basis, such as The Scottish Area Deprivation Index (Kearns et al., 2000), Welsh IMD Index (Nolan, 2016), or other indexes that are based on population survey data in each country's context.

Concept of Index of Multiple Deprivation

The concept of measuring deprivation of the Index of Multiple Deprivation's deprivation index lies in the dimension of deprivation in the area of study, which can be analyzed separately and combined in each dimension. This dimension is defined as a domain, reflecting the pattern of deprivation in each dimension by the area. The base will use the proportion of the population in the area that encounters deprived status. The determination of the domains in each location and each place varies, which in the UK IMD 2019 deprivation index is divided into 7 domains (Noble et al., 2019) namely income, employment, health and disability, education, access to housing and services, environment, and crime domain.

The dimensions of IMD of Wales (Morgan & Baker, 2006), although close to England, still use different domains and the ratios of weight used in the calculation of the index are also different (Jones, 2015; Nolan, 2016). These dimensions include income, employment, health, education, access to health services, community safety, environmental conditions, and housing. The Index of Multiple Deprivation 2007 of South Africa (Noble et al., 2010) only uses 4 domains, which are income and assets, employment, education, and environmental and housing conditions.

Construction of Index of Multiple Deprivation

The construct of IMD can be divided into 6 main steps (*In this article, we consolidated the standardization and transformation processes into one, resulting in an exponential distribution process in number 4*) as follows (Noble et al., 2019):

1. Define domains of deprivation.
2. Choose the best possible measures of each domain of deprivation.
3. 'Shrinkage estimation' to improve reliability of the small area data.
4. Combine indicators to form the domains, generate separate domain scores, rank the domain scores, and transform the scores to a specified exponential distribution.
5. Assign weights to form an overall index of multiple deprivation at small area level.
6. Summarize the overall index of multiple deprivation.

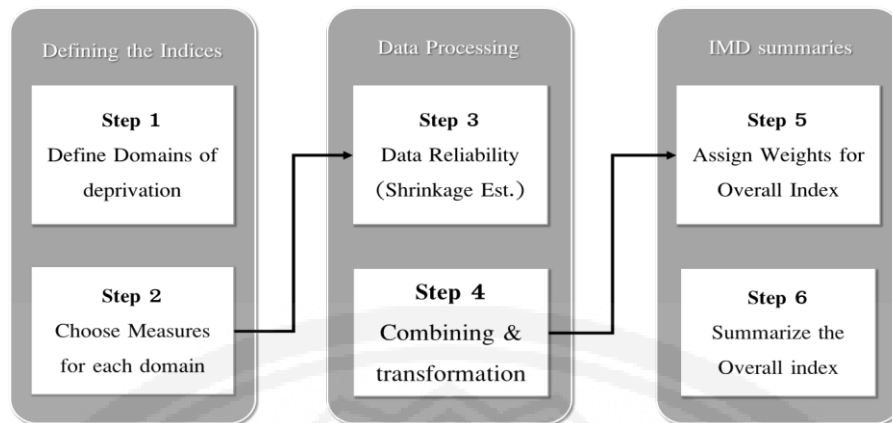


Figure 1 Overview Process of Developing the Index of Multiple Deprivation (IMD).

Source: Adapted from DCLG's Indices of Deprivation.

(<https://osr.statisticsauthority.gov.uk/guidance/administrative-data-and-official-statistics/dclgs-indices-of-deprivation/>)

1. Domains of Deprivation are Identified

Apart from England, the Index of Multiple Deprivation (IMD) has been developed in many other countries, such as Australia (Clark et al., 2012), New Zealand (Exeter et al., 2017), Germany (Maier, 2017), South Africa (Noble et al., 2010), Scotland (Kearns et al., 2000), Wales (Morgan & Baker, 2006), Northern Ireland (Ijpelaar et al., 2019), and Namibia (Chamboko et al., 2017). Each country adjusted the domains and indicators within the index to suit its local context. The defining of the domains of the IMD index is in the first process of creating the index. Each domain must reflect each dimension that creates inequality in society in a spatial sense, where one area may have more inequality in one dimension. The IMD of the UK consists of 7 domains reflecting inequality in terms of well-being, income, employment, health and disability, education, access to housing and services, crime, and environment deprivation (McLennan et al., 2019).

The reason for defining each domain is that each domain has several aspects, such as income, in order to reflect various necessities in the household (McLennan et al., 2011). Townsend (1979) did not include income as a component, but it reflects the lack of necessities in the household or what is called material deprivation, which results from low income. However, according to the English Indices of Deprivation 2010 report (McLennan et al., 2011), "there are no readily available small area data on the lack of socially perceived necessities and therefore low income is an important indicator for these aspects of material deprivation. Moreover, it could be argued that *measures of consumption are themselves problematic as lack of certain items may be by choice rather than inability to pay for them. Therefore, it is appropriate to measure low income itself rather than the possession of certain items*". The English IMD therefore separates income from clear-cut objects, that is, the dimension of income deprivation and the dimension of housing environmental deprivation. This shows that solely focusing on income does not reflect deprivation in all dimensions because there may be additional factors such as housing environmental deprivation.

The IMD for Wales (Nolan, 2016) has 8 dimensions, including 6 dimensions similar to the UK such as income, employment, health, education, and the differing dimension is access to services, which the UK combined into one category, while Wales kept it separate. The other dimensions are similar and differ in detail, such as the disadvantage in access to housing and services in the UK's IMD compared to the lack of home amenities in Wales' IMD. The environmental dimension of the UK's IMD also includes living environment, which is part of the living



environment in the UK's IMD. The dimension of Index of Multiple Deprivation in the UK's IMD is composed of education, health, income, employment, housing, and the environment.

The difference between domains, which represent the dimension of disadvantage, depends on the context of the country, the availability of data, and other factors. The variables in the BIMD or Bavarian Index of Multiple Deprivation index (Fairburn et al., 2016; Hofmeister et al., 2016; Maier et al., 2012), which includes income, education, employment, and the environment, are similar to other IMD indices. However, the BIMD includes municipal revenue, social capital, and social security as well. The BIMD was created in the Bavarian region of Germany and uses data from demography and environmental surveys (Maier et al., 2012). Both sources of data have differences due to the lack of survey data at the Super Output Area level, which is typically done in England, so data cannot be generated at that level (Kuznetsov et al., 2012).

2. Indicators are Chosen to Provide the Best Possible Measure of Each Domain of Deprivation

The Index of Multiple Deprivation in each domain must cover all population groups, all genders, and all ages, in order to reflect disadvantage across all areas within the study or output area and must have sufficient data for small areas to cover all population groups. It may be necessary to use more data from a single source for smaller areas.

Income indicators in England and Europe use a population group that is eligible for public welfare support based on their income (McLennan et al., 2011; 2019; Payne & Abel, 2012) such as Job Seeker Allowance for those seeking employment, adults, and children from income support families, etc. In New Zealand, the survey uses a variety of data sources and financial indicators such as the average income of households in the area (Exeter et al., 2017), which is different from the English Index of Multiple Deprivation.

While the unemployment indicators in the UK, Ireland, and Scotland is represented by the number of registered unemployed individuals who receive unemployment benefits, other metrics are also used such as the number of disabled and disadvantaged people who are unemployed. The population group measured is typically between 18–59 years old. In contrast, only the unemployment rate in a specific area is used to estimate unemployment in South Africa, which is divided into narrow and broad definitions of unemployment (including those who do not wish to work). New Zealand also uses the unemployment rate in the population survey as an indicator.

Health indicators vary from country to country. In the UK, the number of years of life lost and the rate of illness are used. In Wales, Scotland and Northern Ireland, the rate of mental illness among patients, long-term illness, suicide rate and overall death rate are used. Additionally, the proportion of low birth weight is also considered.

The education indicators of the Northern Ireland, Wales and Scotland use the test scores of the children in each level of the three subjects' tests of the children: English, Mathematics and Science, as well as the rate of absenteeism of children who do not receive allowances. The dropout rate from the education system in Northern Ireland is used as an additional indicator of quality and access to education, reflecting factors such as test scores. However, the dimensions of education measurement in southern Africa and New Zealand differ. Both countries use the population aged 16 to 64 years who have not received education (New Zealand does not specify the age range). The challenge that arises is that if the population in small areas has many older people who did not receive much compulsory education in the past, it will result in a higher number of low-opportunity population in terms of access to education.

Environmental indicators are defined by the various definitions of "environment", such as the indoor environment being the place where one lives, the social environment being the external environment, or the lack of amenities, which is essential for daily living, is considered a disadvantage, such as a home without a refrigerator,



telephone, electricity, clean water, or television. While the English IMD has separated the proportion of the population who can't access home ownership or live in overcrowded housing into another domain, countries in Northern Ireland, Scotland, and Wales don't separate this variable. Similarly, in South Africa, but they talk about the disadvantages of housing and the environment instead. Additionally, there are indicators for elderly living alone, social class, access to amenities, vulnerability to flooding, and living in areas with poor air quality, which fall under the Environment domain. The safety indicators in society must reflect the stability and security of life and property. The indicators are usually crime rates in the area, such as the rate of theft, robbery, assault, and property theft. In the UK, 19 types of crime are used as indicators, but these variables are not shown in the Provincial IMD of South Africa and New Zealand due to lack of survey data.

Table 1 The Data Used as Indicators of IMD Domains in Different Countries

Domains	Countries	Data Used	References
Income	England and Europe	Public welfare support based on income	McLennan et al. (2019; 2011) Ijpelaar et al. (2019) Kearns et al. (2000) Payne & Abel (2012)
	New Zealand	Survey uses a variety of data sources and financial indicators	Exeter et al. (2017)
Employment	UK, Ireland, and Scotland	Unemployed individuals who receive unemployment benefits	McLennan et al. (2019) Kearns et al. (2000) Payne & Abel (2012)
	South Africa and New Zealand	Unemployment rate	Noble et al. (2010)
Health and Disability	England	Number of years of life lost and the rate of illness	McLennan et al. (2019)
	Wales, Scotland, and Northern Ireland	The rate of mental illness among patients, long-term illness, suicide rate and overall death rate, proportion of low birth weight	Ijpelaar et al. (2019) Kearns et al. (2000) Nolan (2016) Payne & Abel (2012)
Education	Northern Ireland, Wales and Scotland	Test scores of the children in each level of the three subjects (English, Mathematics and Science) rate of absenteeism of children Dropout rate from the education system (only in North Ireland)	Ijpelaar et al. (2019) Kearns et al. (2000) Nolan (2016) Payne & Abel (2012)
	South Africa and New Zealand	Population aged 16 to 64 years who have not received education	Noble et al. (2010)
Access to Housing and Services	England	Proportion of the population who can't access home ownership or live in overcrowded	McLennan et al. (2019)
Environment	Northern Ireland, Scotland, Wales, South Africa	Elderly living alone, social class, access to amenities, vulnerability to flooding, and living in areas with poor air quality	Ijpelaar et al. (2019) Kearns et al. (2000) Noble et al. (2010) Nolan (2016) Payne & Abel (2012)
	Crime	England	Crime rate is used as an indicator



The table illustrates the diverse data indicators employed to measure the Index of Multiple Deprivation (IMD) across countries. Income indicators feature in England and Europe, while New Zealand utilizes financial indicators. Unemployment indicators vary, with the UK, Ireland, and Scotland focusing on unemployed individuals receiving benefits, and South Africa and New Zealand emphasizing unemployment rates. Health and disability indicators encompass various factors in England, Wales, Scotland, and Northern Ireland. Education indicators vary from test scores in some nations to populations lacking education in others. Housing, services, and environmental indicators are considered in England, Northern Ireland, Scotland, and Wales. Crime rates serve as indicators in England. This diversity highlights tailored approaches to assessing deprivation in distinct contexts.

3. Shrinkage Estimation is Used to Improve Reliability of the Small Area Data

Due to the estimation taking place in a small area where the population is not abundant, namely the Super Output Area (Bond & Insalaco, 2007), which can be further divided into two levels, the Lower Layer Super Output Area (Lower Layer SOA), with an average population in the area of 1,500 people and around 650 households, while the larger level is the Middle Layer Super Output Area (Middle Layer SAO), with an average population of around 5,000 people in the area and around 2,000 households. However, the average population density in this area is around 7,500 people. What may happen from having a small population is that the standard errors are high, so adjustments must be made to the standard errors to make the measurement values most credible. In the IMD indices of many countries (Exeter et al., 2017; McLennan et al., 2019; Nolan, 2016), this review uses shrinkage estimation (McLennan et al., 2019). The estimate will use values that have a deviation from the standard to compare with values in the same area, for example, it may move to the level of the sub-district or district, while the IMD index from the Northern Ireland (IJelaar et al., 2019), Wales (Nolan, 2016), and Southern Africa (Noble et al., 2010) gives importance to the health dimension, regarding mortality, that needs to be adjusted for age and gender as some areas may have a higher elderly population, which leads to a higher death rate.

4. Indicators are Combined to Form the Domains

After adjusting the appropriate values, the indicators should have credibility. The population must then be ordered based on the principle that each domain should be able to measure the shortfall or disadvantage in each household. One important thing in measuring is that the units of the numbers obtained are not the same, because IMD of the UK (McLennan et al., 2019; Noble et al., 2019) uses the amount of supported funds as the measure, causing the dimensions of employment and income to have the same unit as the measure, while other dimensions must standardize the values. This requires ordering and transforming them into normal distributions before using them as sub-indices for other population groups, and Factor Analysis is used to determine the weighting value as a single group before being used to calculate the overall index.

5. Weights to Form an Overall Index of Multiple Deprivation at Small Area Level

After adjusting the values of the indicators in the same dimension, each dimension still has different units of measurement. Therefore, the values must be adjusted to the same unit before. In this step, the population will be ordered and transformed into an Exponential distribution to better identify the population with disadvantaged characteristics.

6. The Overall Index of Multiple Deprivation are Summarized Dimensions

After adjusting the Exponential distribution, the scores obtained must be weighed against the weight of each index. If there is no weighting, it means that each dimension has the same impact and effect on the disadvantage of people in the area. However, some dimensions may have a greater impact on disadvantage than others



(McLennan et al., 2019). The weighting is obtained by considering theory, evidence that can be measured, and policies or outcomes that are related to opinions (McLennan et al., 2019; Noble et al., 2019). This process results in weighting or weight values for each index that differs from country to country, as shown in the following table.

Table 2 The Weighted Domains Table by Countries

Country	England ⁵	South Africa ⁶	South Africa ^{6*}	Namibia ¹	Germany ²	Wales ⁷	North Ireland ³	Scotland ⁴
Domain	IMD	SAIMD	PIMD	NIMD	GIMD	WIMD	NIIMD	SIMD
Income	22.5%	25%	20%		25%	23.5%	25%	28%
Material				20%				
Employment	22.5%	25%	20%	20%	25%	23.5%	25%	28%
Health	13.5%		20%	20%		14%	15%	14%
Education	13.5%	25%	20%	20%	15%	14%	15%	14%
House	9.3%					5%		2%
Safety	9.3%				5%	5%	5%	5%
Living Environment	9.3%	25%	20%	20%	5%	5%	5%	
Services Access						10%	10%	9%
Social Capital					10%			
Community Revenue					15%			

*The SAIMD index is the creation of an index at the municipality level, while the PIMD index is the creation of an index at the provincial level.

Sources: Chamboko et al. (2017); Hofmeister et al. (2016); IJpelaa et al. (2019); Kearns et al. (2000); McLennan et al. (2019); Noble et al. (2010); and Nolan (2016)

Possibilities of Developing Index of Multiple Deprivation in Thailand

In determining the domains of each dimension of disadvantage in Thailand, it is similar to determining the domains in the Index of Multiple Deprivation of countries that have reviewed, such as England, Scotland, Wales, Australia, and New Zealand. However, because the contexts of developed and developing countries are very different. Even though the domains may be similar, the indicators within each domain of deprivation can be different. For example, in England, there has been the use of a population group that receives income support from the government according to certain conditions (Noble et al., 2019; Payne & Abel, 2012). In Thailand, different data should be used by defining the dimensions initially. The dimensions should be defined from 6 domains, which are income, employment, health, education, social and environment, and crime, which is possible to research the data of Thailand. Due to the preparation of the Index of Multiple Deprivation of Thailand, there is an attempt to present an index that shows in small output areas, i.e. at the district or sub-district level, in order to better reflect problems and provide a basis for area-based development indicators. The review of literature is composed of 6 main dimensions, namely income, employment, education, health, social and environment, and crime. These 6 domains come from the importance of measurement with most countries having a common use, including the possibility of having data in Thailand.

Income Indicator Data

Income data has many sources and various survey projects. The surveys of the National Statistical Office include the Household Socio-Economic survey, which questioned household income and household expense where present results at the provincial level using a stratified two-stage sampling method, divided into 77 strata, each



of which is divided into two sub-strata (excluding Bangkok), namely, municipality areas and non-municipality areas. Data presentation is limited only to the provincial level and the sample groups only reflect municipality areas and non-municipality areas, which are not detailed enough for this concept. However, there is also the Basic Minimum Needs survey (BMN) of the Community Development Department, which collects data at the sub-district level. This information is more detailed and can provide more accurate results for the study. In addition, there is further information from the National Statistical Office's estimates, using Small Area Estimation for estimating poverty line at the sub-district level and can be presented at the district level using data from the Household Socio-Economic survey and linked with the Population and Housing census, making it feasible to measure poverty at the district level with adequate data.

Unemployment Indicator Data

Unemployment data have many surveys related to the topic, but due to the IMD index used in this study, which is an index released at the district level, the amount of statistical data is limited. The basic indicator that should be considered is the unemployment rate at the district level. Data from the search process comes from various sources, including the Basic Minimum Need survey (BMN), which has questions about occupation, data from the Labor Force Survey of the National Statistics Office, which presents data at the provincial level. However, the data from the National Statistical Office is only a survey project, which can only report results at the provincial level. The Population and Housing Census, which includes questions about occupation and can be presented in detail at the district level, is a source of interesting information.

Education Indicator Data

The data of interest for educational indicators in this study are the test scores, O-NET for secondary school students and V-NET for vocational students from the National Institute of Educational Testing Service (NIETS). These will serve as indicators of the quality of education at the local level. The limitations are that the assessment cannot be measured at the sub-district level because the unit of the school is not at the sub-district level in some grade levels. The most detailed level is the school level, and it must be divided into educational zones. For example, in the first level of secondary education, one district may have only one school. The details of the educational dimension differ from other dimensions, in addition to the score indicators. There are also indicators for student attendance, which are presented in the same format as scores. Attendance indicators are also provided in primary and secondary education levels.

Health Indicator Data

Health indicators in this study differ from indicators of disadvantage in England, such as the standard mortality ratio, which measures the effects of poor health. However, it is only one indicator. Nevertheless, the deaths of children under 5 years of age can be used to indicate the standard of health care for newborns. indicator for newborns is infant mortality rate.

Living Environment Indicator Data

Social and environmental indicators are divided into indoor and outdoor environmental indicators based on data from the Population and Housing census and the National Statistics Office. Other indicators, such as household ownership of amenities (television, refrigerator, telephone, transportation, and access to information) may also be considered. Information about outdoor environmental conditions may pose difficulties in data collection and accessibility due to lack of historical data at the same time, such as data on weather and air pollution.



Crime Indicator Data

Information on crime occurrences is only available at the district level, according to the records of police stations in each district. Another possible source of information is the National Crime Survey project of the National Statistical Office, which is a collaborative academic effort with the Department of Justice. The survey covers 4 types of crimes: property crime, violent crime, sexual crime, and fraud involving personal or financial information or documents.

Summary of the findings and the reliability of the data for creating the Index of Multiple Deprivation in Thailand, including the source of data and the possible Output Areas, as shown in the following table.

Table 3 Domain and Indicator with Source of Data for IMD of Thailand

Domain	Indicator	Type of Data	Data Source	Output Area	Standardization	Weighted Domain
Income	People Received Supports from Government	Registered	Ministry of Finance	District	Exponential Distribution	Weighted and Combined Domains (District Level)
		Based	National Statistical Office			
Employment	Unemployment Rate	Registered	National Statistical Office	District		
		Based	National Institute of Education Testing Services			
Education	Lowest Score Rank Quantile	Statistics	Ministry of Public Health	District		
		Based				
Health	Standard Mortality Ratio Child Mortality Rate	Statistics	National Police Office	District		
		Based				
Living Environment	Indoor: Living Amenities Outdoor: Environment Pollution	Survey	National Police Office	District		
		Based				
Crime	Crime and Road Accident Rate	Statistics	National Police Office	District		
		Based				

Discussion

Because the index is a measure of the disadvantage status of a population group in many areas, there are objections that the different domains with varying disadvantages will detract from the disadvantage score of the index, which will affect the overall disadvantage score. For example, one area may have high disadvantages in terms of income, but low disadvantage in education, which does not accurately reflect the reality. In this issue, McLennan et al. (2019); Noble et al. (2019) stated that multi-dimensional disadvantage indices do not measure disadvantage with a single number and the disadvantage in each dimension should be considered separately, not as a combined score. The issue of trade-off between disadvantages does not affect indices that do not aggregate scores into a single value.

The quality of data for reflecting the disadvantage may be a problem for creating the IMD index in Thailand due to the fact that most of the data in Thailand still relies on survey data rather than registered data. However, since COVID-19 pandemic, Thailand has developed better data systems serving many economic stimulating schemes which would be valuable for developing small area deprivation index. there is data on income, as Thailand has registered “State Welfare Cards” for the low-income population as a welfare policy of the state. This has led



to the use of registered data in the Income domain. Thus, Income, Education, Health, Crime Domain are available in the registration-based data. Only the domain of employment and living environment still relies on survey data.

The most affecting factor of the index is the characteristics and quality of the data which can reflect the reality of the area to a certain extent. After the index is completed, it needs to be verified to make sure that it is consistent with the reality. For example, the urban area should have a higher population density in households than the rural area. In addition, in the UK's IMD (Noble et al., 2019) index manual, it is also recommended to compare with raw data obtained, compare with data from the previous year, and compare with other published data to ensure the accuracy of the index. Additionally, data issues in Thailand may include the dimension of small areas, as the investigation of data showed that information at a lower sub-district level in Thailand is not available. Presenting data at the district level does not fully address the need for small area information. Furthermore, the process of standardizing data (shrinkage estimation) (McLennan et al., 2019) for small population sizes may not be necessary because the population at the district level is larger than that of the lower super output area (North & Whitworth, 2018). To elaborate further on the potential for promoting fairness and equity, government entities can leverage the IMD to strategically distribute tax budgets and allocate resources. For instance, utilizing the IMD to target health inequities in smaller areas aligns with SDG 3 (Good Health and Well-Being), fostering more inclusive healthcare access. Government bodies like the Ministry of Social Development and Human Security, along with the Office of the National Economic and Social Development Council, can utilize the IMD's insights to tailor interventions for specific regions. This ensures that policy efforts are precise and effectively address local disparities, thus contributing to SDG 10 (Reduced Inequalities). Considering these prospects, the integration of IMD insights into local development plans, enabling more targeted interventions, and supporting SDG-aligned strategies for equitable growth and development.

Conclusion

This article presents the concept of Index of Multiple Deprivation, which is an index used to measure disadvantage and social differences through various domains. The Index of Multiple Deprivation is widely used in various countries and can be used in policymaking to support disadvantaged populations when compared to other groups. By domains commonly found in foreign countries include income, employment, health, education, housing, security, reflecting the quality of life of the population. The availability of data in Thailand was found to be sufficient, although some data such as employment data and environmental housing data are still survey-based data rather than registered data. And importantly, the level of Output Area in Thailand is only presented at the district level, which is not considered a small area. This is because the data does not have a level of precision lower than the sub-district level, which would better reflect the management of the sub-district level. Nevertheless, the Index of Multiple Deprivation is feasible and useful in promoting fairness and equality in society, aligning with the SDG goal. Leveraging the IMD, governments can equitably allocate resources and target health disparities (SDG 3) for inclusive healthcare. Entities like the Ministry of Social Development and the Economic and Social Development Council can tailor interventions, advancing precision in addressing local disparities (SDG 10). Integrating IMD insights into local development plans strengthens targeted interventions, aligning with SDGs for equitable growth.



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