

The Opportunity to Access Better Information Technology

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INTISARI

Anak-anak dilahirkan tanpa bisa memilih sejumlah faktor yang melekat pada mereka. Hal ini nyatanya tidak adil baginya dalam mendukung masa depannya. Indeks Peluang Manusia (HOI) ada untuk menghitung sejumlah faktor yang menyebabkan ketidakseimbangan dan berapa banyak ketimpangan yang harus direalokasi. Penggunaan ponsel telah mencakup 63,86 persen. Ketimpangan yang harus direalokasi adalah 8,76 persen. Pendapatan per kapita dan tempat tinggal adalah faktor yang dominan mempengaruhi. Dalam kasus kepemilikan ponsel, cakupannya masih 33,12 persen, dengan realokasi ketimpangan 17,05 persen. Pendapatan per kapita, tempat tinggal dan sertifikat kepala rumah tangga adalah hal yang paling dominan. Pemahaman tentang realitas sangat penting dalam mengambil kebijakan online terhadap anak-anak yang kebetulan diterapkan selama periode Covid-19 dan mungkin setelahnya.

Kata kunci: Human Opportunity Index, Cellphone, Internet.

ABSTRACT

Children are born without being able to choose a number of factors that are attached to them. This is in fact unfair to him in supporting his future. Human Opportunity Index (HOI) exists to calculate a number of factors that cause imbalance and how much inequality should be reallocated. The usage of the cellphone has covered 63.86 percent. The inequality that must be reallocated is 8.76 percent. Per capita income and residence are the dominant influencing factors. In the case of cellphone ownership, the coverage is still 33.12 percent, with an inequality reallocation of 17.05 percent. Per capita income, residence and certificate of household head are the most dominant things. An understanding of reality is very important in taking online policies against children that happen to be implemented during the Covid-19 period and possibly afterward.

Keywords: Human Opportunity Index, Cellphone, Internet.



INTRODUCTION

Times continue to change, generations take turns coloring human life. The generation born after 2010 is known as the Alpha Generation. Meanwhile, those born in 1995-2010 are called Z-Generation. this generation is also known as i-generation [1]. Able to use the internet in multi-tasking. The abilities and interests of this generation are certainly different from those of the previous generation. Technology is increasingly playing a role in life. The latest development with the spread of the Covid-19 pandemic, the role of technology has deepened. Having the option of working from home and studying from home has deepened the

penetration of technology[2]. It will be interesting then to research in the future on this phenomenon.

The role of the internet in particular and the telephone in general is expanding, many things can be done without changing places nowadays. Business, schools, offices and daily necessities can be done without moving places [3]. Internet in general even brings new rich people in the world, opening up business opportunities. Even marketing via the internet is a mandatory menu in today's business. [4].

Not all children can enjoy the benefits of technological advances. This happens not only because of the choice of the child but also by many

things that are beyond the child's control. Factors such as income per capita, gender or place of birth, as well as the education of the head of the household, the work status of the head of the household, and even the sex of the head of the household can be an obstacle for a child to get access to education. The Human Opportunity Index (HOI) is an indicator to calculate a person's chances of getting justice in accessing basic needs such as information technology by taking into account all the factors above[5].

HOI has a number of advantages when applied [6]; (i) how many opportunities are available, defined by the level of access to basic needs; and (ii) how evenly these opportunities are distributed. This information, which also reveals the problem of gaps, should facilitate the making of intervention policies. Problems would be better resolved as early as possible. Because the problems will get bigger, wilder and even tend to be out of control. This intervention during childhood also provides a sense of justice to children for something they have to get, because basically they cannot choose when they are born [7].

This is the first research on HOI with the theme of information technology in Sumatera Barat Province. In general, the use of HOI is still very rare in research. Several previous studies have been conducted Vani and Madheswaran in 2018 who examined Inequalities of Human Opportunities in India: A State-level Analysis.

This research aims to reveal children's access to information technology in Sumatera Barat and the unequal opportunities for these children to access information technology. It will also examine what factors are the most dominant in influencing this inequality. This activity will be carried out in Sumatera Barat Province using 2019 Susenas data. The information technology referred to in this study will be represented by;

- Children are defined as children aged 5-17 years
- Use a cell phone, that is, in the last three months, have used a cell phone
- Owning a cell phone, namely in the last 3 months owning / controlling a cell phone
- Computer, that is, in the last 3 months using a computer.

- Using the internet, in the last 3 months have used the internet.

At the end of all this we will find the magnitude of the imbalance that occurs and what affects it. So that it can be a foothold for stake holders to make the right intervention steps.

METHODOLOGY

HOI (H) is defined as the amount of coverage (p) of a basic need less penalty (r). Penalty (r) relates to an inequality in the distribution of access among individuals in different sets of circumstances.

$$H = \bar{p} - r \quad (1)$$

H= HOI

\bar{p} = Coverage

r = Penalty

The penalty value will depend on the circumstances used. If the coverage is independent of the circumstances used, the penalty will be zero. So in this case access will be universal, an ideal condition. HOI is the maximum value, which is equal to p.

HOI can also be written in other forms, namely:

$$H = \bar{p} \left(1 - \frac{r}{\bar{p}}\right) = \bar{p}(1 - D) \text{ whereas}$$

$$H \leq \bar{p} < 1 \text{ and } H \leq D \leq 1 \quad (2)$$

H= HOI

\bar{p} = Coverage

r = Penalty

D= Dissimilarity index

(1-D) is called an equality factor which will be worth one if access to basic needs or opportunities is not related to circumstances. Whereas D states the dissimilarity index which can be interpreted as the share of the total opportunity that needs to be reallocated between groups with various circumstances, to ensure that each group has the same level of access.

$$D = \frac{1}{2\bar{p}} \sum_{i=1}^n \alpha_i |p_i - \bar{p}| \quad (3)$$

D= Dissimilarity index

\bar{p} = Coverage

r = Penalty

α_i = the weight which states the share of the number of individuals who are in group-i

i = groups of individuals who are in a certain set of circumstances

p_i = the level of coverage (or access) of group-i

n = groups of individuals who are in a certain set of circumstances

θ_A = Decomposition Shapley of HOI

D_A = Dissimilarity index for A condition

D_N =Dissimilarity index for all condition

Regresi Logistic

The magnitude of a child's conditional opportunity to access his basic needs can be expressed in a logit model. Where the independent dichotomy variable (Y), if 1 states n passed and 0 states did not pass.

$$\ln \left(\frac{P[Y=1|X=(x_1, \dots, x_n)]}{1-P[Y=1|X=(x_1, \dots, x_n)]} \right) = \sum_{k=1}^n x_k \beta_k \quad (9)$$

Logistic regression will help in explaining the influence of a variable on the model and most importantly, explaining the significance of a variable.

This study uses HOI as an analytical tool. In his analysis, the inequality of condition is a variable that cannot be controlled. The basic services to be treated as variables are bound to a different equation. The scheme can be simplified in Figure 1 as follows:

HOI Procedure

Furthermore, the amount of predictions that an individual can access certain basic needs based on their circumstances can be formulated as follows:

$$\hat{p}_i = \frac{\exp(x_{ki} \hat{\beta}_k)}{1 + \exp(x_{ki} \hat{\beta}_k)} \quad (4)$$

\hat{p}_i = HOI predictions

x_{ki} = independent variable

$\hat{\beta}_k$ = appropriate parameters

If the predicted level of average coverage (\hat{p}) is as follows:

$$\hat{p} = \sum_{i=1}^m w_i \hat{p}_i \text{ whereas } w_i = 1/n \quad (5)$$

w_i = weights

\hat{p}_i = HOI predictions

and the dissimilarity index prediction \hat{D}

$$\hat{D} = \frac{1}{2\hat{p}} \sum_{i=1}^m w_i |\hat{p}_i - \hat{p}| \quad (6)$$

So that the HOI prediction can be written as follows:

$$\hat{H} = \hat{p}(1 - \hat{D}) \quad (7)$$

HOI Decomposition

In some situations, it is necessary to see the contribution to a condition:

$$\theta_A = \frac{D_A}{D(N)}; \quad \sum_{i \in N} \theta_i = 1 \quad (8)$$

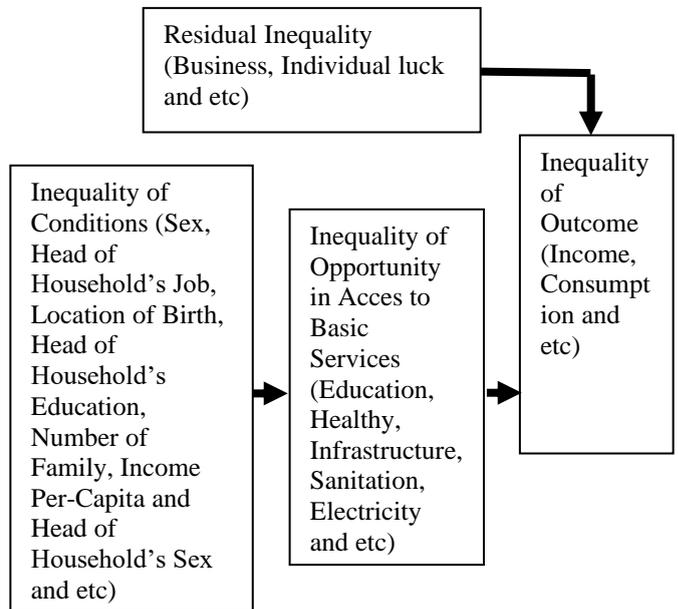


Figure 1. Source of inequality in accessing basic needs.

Other influencing factors are placed as residual inequality. Residual inequality is an option that can be chosen by each individual. The business that is occupied, how is one's luck in the journey of life and motivation in achieving the necessary access and other factors are examples of residual inequality. The inequality of the out of control variable and the controlled variable is the source of

the inequality of outcome. So clearly, HOI is superior to other methods because it can break down the inequality of outcome.

Based on this scheme, this research will use uncontrollable state variables as follows:

- The sex of the child, score 1 for boys and 0 for girls
- The location of the child's residence, worth 1 for urban and 0 for rural areas
- Number of family members
- The sex of the head of the household is 1 for male and 0 for female
- Work status of the head of household, worth 1 for work and 0 for not working
- Education of the head of the household, with a score of 1 for SMA and above and 0 for SMP and below
- Per-capita income of household heads

The data used is SUSENAS data which was conducted in March 2019. This survey for Sumatera Barat Province consists of 10,743 samples of household heads. The survey was conducted in all districts / cities in Sumatera Barat Province.

RESULTS AND DISCUSSION

The human opportunity index produced in this study is presented in the following table. In table 1, the HOI results for using Cellphone are presented.

Tabel I. Coverage (C), Dissemillarity (D), Human Opportunity Index (Hoi) and Penalty Value for Cellphone use In Sumatera Barat Province

No	Variable	Value
1	Coverage (C)	63.86
2	Dissemillarity (D)	8.76
3	Human Opportunity Index (HOI)	58.27
4	Penalty	5,60

The coverage level of cell phone usage among children in Sumatera Barat province in 2019 has reached 63.86 percent. That means 63.86 percent of children have used cell phones. The Dissimilarity Index explains that the share of inequality that must be relocated is 8.76 percent. Meanwhile, the equality of opportunity for preschoolers reached 58.27 percent. Thus, the penalty which is the

difference between coverage and HOI is 5.60 percent.

The results of the Shapley decomposition by taking into account 7 variables that are considered outside the child's control, as presented in Figure 1. It can be seen that the income per capita; residence and the certificate of the head of household greatly affect the use of cell phones. Income is worth more than half, namely 52 percent, while residence is 20 percent and the certificate of the head of the household is worth nearly 18 percent.

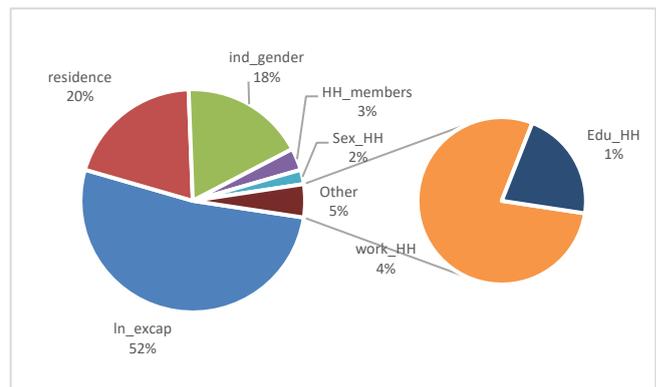


Figure 2. Shapley decomposition for Cellphone use in Sumatera Barat Province in 2019.

Factors that were considered insignificant in this study were the work status of the head of the household and the number of household members. This conclusion is obtained from the logit model where the two variables are not significant. It is interesting here, although the value of the shapley decomposition of the individual sex and the sex of the head of the household is smaller than the number of household members, the two previous factors have an effect.

Using a cellphone clearly requires a good family income. Although children do not have to have it, because the closest access is family, family income becomes important as shown by the shapley decomposition. It is also supported by logistic significance. Because using a cellphone is not only a matter of buying but also financing credit and data packages [8]. When it is urgently needed during a pandemic, one of the government policies is to issue pulses and data packages for students and teachers. It will be very interesting to make an analysis when the data becomes available. This is one of the benefits of HOI, regarding how reallocation of inequalities is distributed. Because in 2020 the government is doing extraordinary things by distributing data packages [8].

Table 2. Coverage (C), Dissemillarity (D), Human Oppportunity Index (HOI) and Penalty Value for Owing Cellphone In Sumatera Barat Province

No	Variable	Value
1	Coverage (C)	33,12
2	Dissemilarity (D)	17,05
3	Human Oppportunity Index (HOI)	27,47
4	Penalty	5,65

Owning or controlling CELLPHONE, has a lower coverage of only around 33.12 percent. This is as illustrated in table 2.

The Human Oppportunity Index (HOI) is worth 27.47 percent. The amount of inequality that must be allocated is 17.05 percent. This number is interesting considering that when schools were online, the number of cellphones that had to be available had to be large. If not, there will be a struggle between the child and the parents.

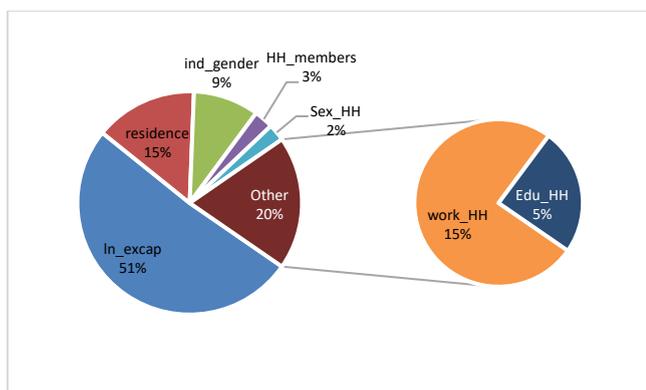


Figure 3. Shapley Decomposition for Cellphone use in Sumatera Barat Province in 2019.

The thing that greatly affects the ownership of a cellphone is the per capita income. According to shapley decomposition the effect of per capita income reaches 51 percent. Residence has an effect of 15 percent. In this research, the certificate of the head of the household with the effect of 15 percent does not even affect the logistic model.

Ownership demands more conditions, this is then evident from a power that is less than just wearing. Ownership in terms of per capita income is similar to using a cellphone. Per capita income is certainly the most important condition because having a cellphone has to pay a fee. The impact of the neighborhood began to decline because cellphone loans from friends were no longer counted. The number of household members has also become more sensitive, with more household members, of course, more cellphones to buy.

Table 3. Coverage (C), Dissemillarity (D), Human Oppportunity Index (HOI) and Penalty Value for Computer acces In Sumatera Barat Province

No	Variable	Value
1	Coverage (C)	17,36
2	Dissemilarity (D)	28,87
3	Human Oppportunity Index (HOI)	12,35
4	Penalty	5,01

This ownership is an issue that is quite important because during the pandemic there were many complaints about cellphone ownership. Many parents are starting to try to buy their children cellphones. This happened because of the demands of learning from home.

From table 3. the coverage of access to computers is 17.36 percent. The equal opportunity to access computers is only 12.35 percent. Furthermore, reallocation of inequalities that must be done is 28.87 percent.

In this research, the most influential thing is household income per capita, amounting to 34 percent. Residence and certificate of head of household by 29 percent. Furthermore, the individual sex of the child is 3 percent.

The sex of the household, the work status of the head of the household and the number of household members do not have an effect on this

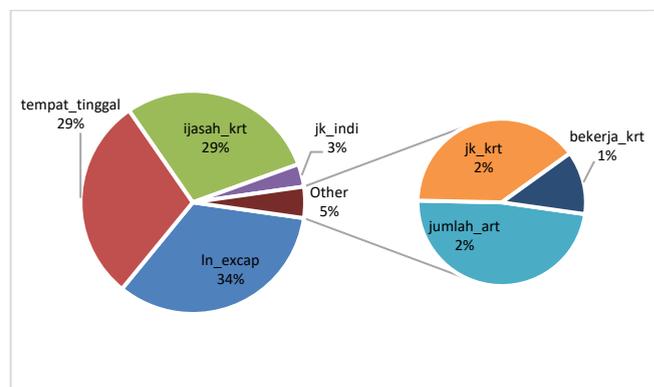


Figure 4. Shapley decomposition for Computer Access in Sumatera Barat Province in 2019.

In general, cellphones are preferred over computers, because they can function for communication, playing games and so on [8]. The computer is more limited, this makes the coverage very low compared to our previous 2 variables. This access also makes the income per capita less absolute because you can get access from schools or internet cafes.

Residence becomes more influential because of the completeness of computer rental facilities or

schools that have computers. Furthermore, the diploma of the head of the household will be higher because it will benefit more from computers and make access to children greater [9].

Coverage to the internet has reached 35.03 percent. Equality of opportunity in internet access has reached 28.77 percent. However, the inequality that had to be reallocated was 17.86 percent.

Tabel 4. Coverage (C), Dissemilarity (D), Human Opportunity Index (HOI) and Penalty Value for Internet In Sumatera Barat Province

No	Variable	Value
1	Coverage (C)	35,03
2	Dissemilarity (D)	17,86
3	Human Opportunity Index (HOI)	28,77
4	Penalty	6,25

Per capita household income is 45 percent. Because accessing the internet requires a fee. Residence has a high enough role because it is possible to enjoy the internet. In this study, residence had an effect of 26 percent. Meanwhile, the certificate of the head of the household has an effect of 17 percent. Meanwhile, the number of household members, the sex of the individual and the working status of the head of the household no longer have an effect in this regard.

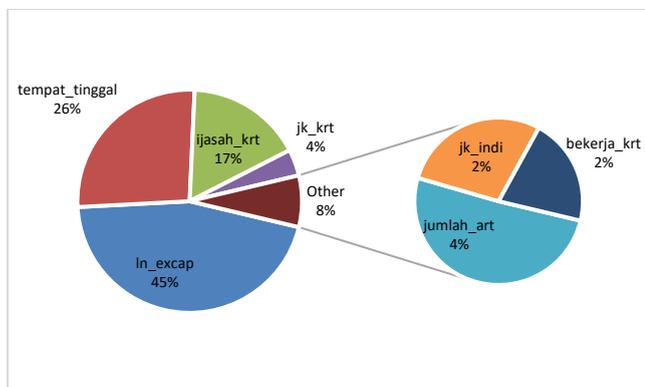


Figure 5. Shapley decomposition for the Internet in Sumatera Barat Province in 2019.

Access to the internet for children is quite high even when compared to ownership of cellphones and computer access. This is reasonable given the need for the internet to increase from time to time. The demand for the internet will also increase, especially when online schools are introduced, learning from home. So the role of the internet is very important. It is not only a matter of cost, but also a matter of signal being important.

CONCLUSION

The use of cellphones has the highest coverage, because it can be used from anywhere, so that in addition to per capita income, the place of residence also has a big effect. Meanwhile, the number of household members is not significant. In the case of cellphone ownership, the effect is slightly different, per capita household income is still important, where the influence is reduced. The diploma of the head of the household is no longer significant while the number of household members is taken into account in this study.

Access to computers has the lowest coverage in this study, only 17.36 percent. Computers are generally considered more of a means of working. Access to computers does not focus on the household's ability to buy but also on housing and education of the head of the household.

Internet access for children has only reached 35 percent. Per capita income and residence have a dominant influence. This fact is very important in facing the pandemic era. The above facts can be used to make policies that are ready to increase access to this information technology.

SUGGESTION

This research will be very useful during the current Covid-19 pandemic. Online learning issues and greater online dependence in the future even though COVID-19 subsides. So what is needed is not only the pulse but also the cellphone. Perhaps for the purpose of studying the government could also stimulate the use of cheap tablets for learning.

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