The Total Economic Burden of Breast Cancer in Makassar South Sulawesi, Indonesia

(*Cost of Illness Analysis* and *Disability Adjusted Life Years Approach)*

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ABSTRACT

Breast cancer is the most common cancer and is a major cause of death among women around the world. Understanding economic burden of diseases is important to prioritize health problems and diseases. Cost of Illness (COI) Analysis and Disability Adjusted Life Years (DALY) are useful method to measure economic burden of diseases. The aim of this study is to examine economic burden of breast cancer in Makassar and their associated factors. A cross sectional study was applied in this study. A total of 30 breast cancer death cases from a national referral hospital in the last three years were included. In depth interviews were conducted among their relatives. This study found that a total cost of breast cancer treatment in Makassar, covered by insurance, was US $100,000- (mean US $ 3,300-) and was US$ 67,200 from household expenditure (mean US $ 2,200-). A total of economic burden - YLD is US $ 7,760 (Mean US $ 2,589), YLL is US $ 1,579,680 (Mean US $ 52,656). The total of DALY is US $ 1,657,370), (Mean US $ 552,456) , The total economic burden of breast cancer in Makassar is US $ 1,824,413- (Mean US $ 60,813). From this finding it can be estimated the Government of South Sulawesi Province need US $ 1,7 billion, which is equal to six times of their provincial annual health budget, to treat all breast cancer patients. In conclusion, there is high economic burden of breast cancer. Therefore, health promotion and prevention measure should be prioritized.

Key words: Breast Cancer, Economic Cost, YLD, YLL, DALY

1. INTRODUCTION

The incidence of breast cancer in the industrialized countries was about 99.4 per 100,000 populations (Lidgren 2007). Every year there is 1 million new cases diagnosed as breast cancer and 400,000 women died due to breast cancer, whereas in the U.S. to be the second leading cause of death (15%) after lung and bronchus cancer (Jemal, Siegel et al., 2009). Currently breast cancer is a public health problem because the incidence increased by 5% every year (Groot, Baltussen et al. 2006).

In Indonesia, according to the Basic Health Research (Riskesdas, 2008), the prevalence of cancer is the sixth national disease patterns and become the top seventh cause of death with the percentage of 5.7%. Hence, breast cancer is the second highest prevalence (15.6 mile) after cervical cancer (19.3 per thousand). In South Sulawesi, the prevalence of breast cancer is estimated about 4.78 per mil, below the national

average rate of 5.03 per thousand, but more than in the province of West Sulawesi and Central Sulawesi (Oemiati, Rahajeng et al. 2012). Reports from the Department of Health showed that highest cancer among women was breast cancer with incidence 26 per 100,000 women (Ministry 2010). In other countries this figure ranges from 12-80 per 100,000 women, while in Japan has the lowest rate with 12/100.000 women. There are 100 new cases occurred among 100,000 people with a tendency to increase from year to year.

Breast cancer usually occurs on women aged over 40 years, since at this age usually women produce not good quality of cells. about 50% of breast cancer patients aged above 50 years (Purwatiningsih 2006). Breast cancer is a disease with the biggest expense after cardiovascular disease (Richards 1993). In the United States is estimated to cost as much as $ 171 billion. Only a third of the cost is covered by the Government Insurance and Health Insurance Commercial (Arozullah, Calhoun et al. 2004). All countries in the world are experiencing budget constraints of breast cancer response, both developed and developing countries, including Indonesia. Since last three decades, it has been known that method of Cost-of-Illness Analysis (COI) to calculate the direct costs by society due to that illness. This method is also known as the terminology Public Costs of Illness, or the Economic Costs of Illness, (Wouter and Lieven 2010). COI method is widely used in clinical-based studies that emphasize aspects of health care financing in the means by which a quantity can be traced. COI method is more focused approach to the case through a bottom-up approach (Clabaugh and Ward, 2008).

In 1996, Murray and Lopez with Global Burden Diseases research offers a single measure of population health or SMPH (Summary Measure of Population Health), known as Disability Adjusted Life Years (DALY) (Murray 1994; Murray and Lopez 1997; Murray and Lopez 1997). DALY method emphasizes the burden of disease due to years lost generated by illness / disability (Years Lived with Disability / YLD) and effects due to premature death (premature death) (Years of Life Lost / YLL). The approach used is mainly based population through a top-down approach (Tarricone 2006). Both approaches, COI Analysis and DALY are widely used to set priorities for the allocation of resources and the development of health financing (Wouter and Lieven 2010). This research was conducted using the COI Analysis and DALY that aims to calculate the economic burden of disease in the Breast Cancer in Makassar South Sulawesi province.

2. MATERIALS AND METHODS

This analytic survey design applied a cross-sectional study through the exploration of cases in breast cancer patients / bottom-up approach in order to calculate the financial burden of breast cancer patients. The study was conducted from January to June 2013 in the hospital of Wahidin Sudirohusodo Makassar and home visits subjects in Makassar South Sulawesi. Population was all patients who died of breast cancer and recorded on the data of breast cancer mortality at Wahidin Sudirohusodo Hospital in 2010-2012 and were stayed in the city of Makassar that able to be traced the address and financing. Factors related to the breast cancer such as nutritional status, disability, disease duration, source of funding, treatment patterns, household expenditure were obtained through questionnaires and interviews with close family as informants. Secondary data were obtained through a search of medical records and Hospital

Information System to determine the direct medical costs, components of hospital costs and resource costs.

A direct cost used to finance the cost of health care as a result of suffering from a disease. Direct costs consist of direct medical costs and direct non-medical costs (direct non-medical costs). Direct medical costs included in direct medical costs is the cost of registration, accommodation, care / outpatient care, inpatient care, intensive and emergency care, the cost of investigation to establish the diagnosis, physician services and other health workers, drugs and radiotherapy, the costs of action and follow-up care, rehabilitation, medical equipment usage fees. Direct non-medical costs are not medical costs but relate directly to support the care process and disease treatment such as transportation costs, household expenses for eating, drinking, bathing, washing and toilet and informal costs Other (Gómez-Rico1, Altagracia-Martínez1 et al., 2008).

Indirect costs are the costs of lost productive time due to illness and premature death that is determined by using the DALY approach in later years converted into dollars. Indirect costs are included in the cost basis of complementary and alternative medicine. Total Economic Cost obtained from the sum of direct costs in hospitals in cases of breast cancer who died in the last 3 years, and (indirect costs) that have been converted in rupiah approach of Disability Adjusted Life Years (DALY) is number of year and month lost due to early death (Years of Life Lost / YLL) and the loss of productivity due to disability / disability because a person suffering from breast cancer (Years Lived with Disability / YLD) as that have been converted in rupiah. Data analysis using descriptive analysis techniques - inductive and cluster analysis, the data is processed and presented by Microsoft Excel.

3. RESULTS

During the 3 consecutive years, in 2010, 2011, and 2012, there were 502 cases of breast cancer were treated at Wahidin Sudirohusodo hospital, Makassar. There were 104 (20.7%) who died. Of those breast cancer cases who died there were 30 cases who resided in Makassar city. We found 30 informants (close relatives of patients) as a source of information. Below is the table 1 describe the socio-economic characteristic of respondents.

Table. 1 Socio-economy characteristics of breast cancer patients in Makassar, 2013

No	Characteristics	n = 30	%
1	Age ≤50 >50	 22 8	 73 27
2	Marital status Marriage Un marriage	 24 6	 80 20
3	Education level Junior high school Senior high school Higher education	 15 12 3	 50 40 10

4	Occupation		
	Household	20	66,7
	Private sector	6	20
	Civil servant	4	13,3
5	Monthly earn		
	< Rp.1.200.000	18	60
	Rp.1.200.001- Rp.2.500.000	9	30
	Rp.2.500.001-Rp.5.000.000	3	10
	>Rp.5.000.000	0	0
6	Payment		
	Jamkesda (regional health insurance)	11	37
	Jamkesmas (society health insurance)	8	27
	Askes (Health insurance)	8	27
	Umum (Public)	3	10
7	Sick duration		
	$\leq$12 month	5	17
	13-24 month	12	40
	$\geq$ 24 month	13	43
8	Nutrition Status		
	Obesity	8	27
	Non-obesity	22	73
9	Disabilitas level		
	Slight	7	23
	Medium	19	63
	Severe	4	13
10	Tradisional medicine		
	> 3 times	3	10
	$\leq$3 times	17	57
	Never	10	33

Most patients with breast cancer was at the age of $\leq$ 50 years group with 22 people (73.3%) and lowest in the age group $\geq$ 50 years (26.7%). Youngest age at death of 24 years and the oldest 66 years. There were 24 people (80%) are married and a small portion is 6 people (20%) unmarried status. Most work in non-formal sector ; household mother that 20 people (66.7%), the remaining 6 (20%) of private sector, and civil servants were 4 people (13.3%). In terms of revenue, most have incomes <Rp.1.200.000 that 18 people (60%), other 9 people (30%) with revenues of Rp. 1.2 million, the remaining 3 (10%) have incomes Rp.2.500.001-5.000.000., none have an income> Rp. 5 million per month.

Based on a illness duration, there were 5 cases (16.7%) $\leq$ 12 months, 12 people (40%) 13-24 months, the remaining 13 (43.3%) with the disease duration $\geq$ 24 months. The average length of hospitalized breast cancer patients was 23 months. The duration of the lowest illness was 8 months and the highest was 46 months. Based on the traditional treatment seeking patterns, most

of the respondents had done traditional medicine (complementary / alternative), 20 people (67%) and a small portion of 10 people (33%) have never done traditional treatment.

The type of payment, (36.6%) are paid through Jamkesda, the rest paid by JAMKESMAS and PT Askes partners. Of those 30 breast cancer cases were treated at the Wahidin Sudirohusodo hospital, Makassar, the magnitude of medical cost was Rp. 1,508,778,760.- (an average of Rp. 50,292,625.-), Which consists of health insurance that is guaranteed by government were Rp. 997,937,096. - (An average of Rp. 33,264,570. -), then, paid 'difference' (Out of Pocket) Rp. 510,841,664. (An average of Rp. 17,028,055). Direct non-medical cost Rp. 161,660,000 (An average of Rp. 5,388,667). Medical care costs (medical cost) of Rp. 997,937,096. -, The largest (65%) paid JAMKESNAS, the rest successively covered by PT. Health insurance (the partners), Jamkesda, and the Hospital Subsidy 20%, 13%, and 2%. Of the entire medical cost Rp. 1,508,778,760. - (An average of Rp. 50,292,625. -), Was covered by the patient as Out of Pocket by 34% or Rp. 510,841,664. - (An average of Rp. 17,028,055.).

The amount of household expenditure is number of Out of Pocket Rp. 510,841,664 (average Rp.17, 028.055) and non-medical cost Rp. 161,660,000. - (An average of Rp. 5,388,667) Entirely is Rp. 672,451,664 (An average of Rp. 22,416,722). So the amount of Total Direct Cost was Rp. 1,670,438,760. An average of Rp. 55,681,292). Indirect cost is the sum of the YLD and YLL of Rp. 16,573,700,000 Or an average of Rp. 552,456,667.

So the Total Economic Cost of breast cancer is (Direct Cost + Indirect Costs) was Rp. 18,244,138,760. - Or an average of Rp. 608,137,959. From those two informants we obtained information concerning the cost of traditional medicine (complementary and alternative) respectively Rp. 30 million and Rp. 40 million, respectively. Traditional medical expenses are included in household expenditure. Total Economic Cost = Direct Cost + Indirect Cost = Rp. 1,670,438,760 + Rp. 16,573,700,000 = Rp. 18,244,138,760 or Rp. 608,137,959.

Table 2. Cluster grouping by category long illness, nutritional status and disability in patients with breast cancer Makassar, in 2013

No.	Variables	Accepting	Survivor	Hopeless
1	Illness duration	Long	Medium	Long
2	Nutritional status	Not Obesity	Not Obesity	Obesity
3	Disability	Medium	Minor /medium	Severe

Of several variables such as illness duration, nutritional status and degree of disability, the grouping is done based on the 'cluster' with the criteria of accepting (resigned to accept his illness), survivors (trying and hoping cured) and hopeless (hopeless).

Table 3. Average Direct Cost, Indirect Cost and TEC based clusters of breast cancer patients in Makassar, in 2013

No	Category	Direct Cost (Rp)	Indirect Cost (Rp)	Total Economic Cost (Rp)
1	*Accepting*	39,056,503	528,320,000	567,376,503
2	*Survivor*	76,343,904	636,506,250	712,850,154
3	*Hopeless*	14,592,816	276,600,000	291,192,816
	Total	129,993,223	1,441,426,250	1,571,419,473

Data in Table 3 shows that the average direct cost is the highest portion for the survivor category is Rp. 76,343,904 whereas the lowest is at hopeless category with Rp. 14,592,816. In addition, the average highest portion of Indirect Cost also is a category of 'survivor' was Rp. 636,506,250 whereas the lowest was hopeless category. Thus, the average of total economic cost of the highest in survivors was (USD 712 850 154), After accepting (USD 567 376 530) and the hopeless (291 192 816).

4. DISCUSSIONS

Characteristics of the respondents indicated that all of 30 breast cancer cases were women. Men can also develop breast cancer, although less likely than 1 in 1000. In term of marital status, more cases of breast cancer were married with 80% whereas 20% were unmarried, although cannot be denied that breast cancer risk is influenced by women who postpone marriage. One study found the percentage amounted to 93.9% of married women and 6.1% of women who are not married. Breast cancer patients by age showed that most respondents were in the age group ≤ 50 years ie 22 (73.3%) and lowest in the age group ≥ 50 years (26.7%). It is rarely to find the Breast cancer before the age of 30 years. But after it gradually increased, and reached its peak at the age of 35-45 years and an increase after age> 65 years (Oemiati R 2011). Other findings found (78%) of breast cancers occur in patients older than 50 years and only 6% in patients less than 40 years. Dharmais Hospital reports from Jakarta in 2006, that age of breast cancer patients most (over 50%) were in the age over 50 years. Noorsaadah from Malaysia in 2005 found that nearly 60% of breast cancer patients aged 41-55 years (Mr Norsa Adah, Rush et al. 2005).

Based on nutritional status, the majority of breast cancer cases were non-obesity before get the disease, 18 people (79.3) and few have obese nutrition, 5 people (21.7%). In various studies found a positive association between body weight and body shape with breast cancer in postmenopausal women. Variation of the frequency of these cancers in Western and non Western countries as well as the frequency changes after migration suggests that there is an influence of diet on the occurrence of this malignancy. However, report of Kelantan, Malaysia in 2005 found almost half (49.7%) breast cancer cases occurred in women overweight or obese.

(Mr Norsa Adah, Rush et al. 2005). Risk in women who are breast cancer obese higher than those of women with a body weight within normal limits, especially in postmenopausal women (Simpson 2009).

In addition, breast cancer patients occupation are mostly housewives, most of the respondents are working at the non-formal sector like Housewife (IRT), 20 people (66.7%), the rest were public servants or private sector employees. Other researchers have also found that most cases are women with breast cancer status housewife (Mr Norsa Adah, Rush et al. 2005; Purwatiningsih 2006). From these data it appears that the majority of breast cancer cases seeking treatment at Dr Wahidin Sudirohusodo come from lower economic level. This is because Dr Wahidin Sudirohusodo as a regional referral center for hospitals which are nearby to the breast cancer cases especially coming on stage is advanced. In addition, with the Social Security program of the government facilitate public access to get better service.

Regarding income breast cancer patients, they mostly are housewives who do not work with the formal sector income <Rp.1.200.000 per month. Difficult to determine the income of a IRT because they include non-labor market that does not have a fixed income standards are taken into account in determining the Gross National Product (GNP) of a country (Cooper and Rice 1976). To calculate the economic losses and income housewife can use Minimum Wage as a minimum standard. South Sulawesi Regional Minimum Wage is Rp. 1.2 million (maidins 2003). Most of the breast cancer patients treated Wahidin

Sudirohusodo hospital in Makassar financed by the Government Health Insurance (90%), especially Jamkesda and medical treatment. This is not surprising because the Government through the HIP program (poor public health insurance) guarantee a certain amount of medical expenses up to the poor population health card holders. The civil servants also secured government health costs through PT Askes which premi are paid through PNS salary deduction.

Of Total Direct Cost of Rp. 1,670,438,760, Most (80%) payment through the Poor Family Health Insurance, means that 80% of breast cancer patients treated in Wahidin Sudirohusodo hospital relatively poor family and is guaranteed by the Government Health Insurance. A serious Attention should be paid to the big difference' (Out of Pocket), which ranges from 44% of the direct medical costs. The biggest payment difference is paid by the category 'Jamkesda', meaning that the cost to the local government through 'Jamkesda' has not been able to finance all direct medical expenses. From the case study of the breast cancer found that the Total Economic Burden is Rp. 18,244,138,760. Or an average of Rp. 608,137,959. Of this amount consists of the sum of the Direct Cost of Rp. 1,670,438,760 and Indirect Cost of Rp. 16,573,700,000. It appears that the Indirect Cost is much greater than Direct Cost, which is 10-fold. A Swedish study in 2002 with a top-down approach reported that apparently greater indirect costs three times higher than the direct cost and Total Cost of breast cancer disease are the order of the four largest after the illness of depression, stroke, diabetes mellitus (Lidgren 2007). Direct

Cost of breast cancer patients who had been treated and died at Wahidin Sudirohusodo hospital in period of 2010 to 2012 can be calculated from the reports of the Hospital Information System (SIRS) and information of the close relatives of patients. One study in California in 2009 found the Total Economic Burden of breast cancer disease 2001 were $ 1.43 M and $ 1.91 M in 2008 (Wendy Max 2009).

A study involving 29 cancer centre in the United States found the cost of surgery and chemotherapy a breast cancer patient with stage III-IV was $ U.S. 23000-31000 or Rp. 218 million. - Up to Rp. 294,500,000. - (Exchange rate of Rupiah / U.S. $ Rp. 9,500. -). Compared with these studies, direct medical costs per patient treated in the Wahidin Sudirohusodo hospital was Rp. 50,592,625. - Is still smaller (Campbell 1 March 2009 -). Other studies also showed that direct medical costs for breast cancer patients in Makassar smaller than those in abroad. For example by Rai et al in 2004 examined 397 breast cancer cases in the United States since diagnosis to death last for an average of 16.2 months, with an average total direct medical cost of $ 35.164. - (U.S. $ 334 million), in this study found the duration of breast cancer sick average was 23 months. Likewise, Wai et al in 2001 in Canada examined 75 breast cancer patients began diagnosis until death found the average direct medical cost of $ 36.474. - (Equivalent to Rp. 346,503,000.) was used for treatment and hospitalization (Way LM 2003). A study by Kim of Korea in 2002 found direct medical costs and mortality costs (YLL), respectively for 13.7% and

65.3% of the Total Cost breast cancer disease (KIM SG, 2002), while the research found in Makassar were 9.7% and 86%, respectively. Although the cost of breast cancer treatment in the Hospital in Makassar is smaller compared to other countries, but for developing countries, including Indonesia, have become a burden to the government and society. If it is calculated based on the prevalence of the breast cancer in South Sulawesi, will require a total cost of Rp 1.7 T, to cover all breast cancer cases (old and new), means almost 6 times the South Sulawesi provincial government budget health (USD 302 M) only pay for the breast cancer disease treatment in the Hospital. Not include if we calculate all the costs involved ranging from preventive, promotive, curative and rehabilitation, the total budget of the Regional Government and the Centre is still very small. Which can be traced only formally quantified Direct Medical Cost (direct medical costs), whether paid by government health insurance (Jamkesda, JAMKESNAS and PT Askes) and pay the difference.

Difference in pay including direct expenditure into the household (Household Expenditure) along with non-medical Direct Cost. HHE magnitude is determined by the amount of 'pay the difference' which still must be borne by society due to suffering from breast cancer. Of this study revealed that there are still as many as one-third of the direct medical costs (direct medical costs) to be paid by the patient / family. It can be a 'cathastropic payment' for the community that could potentially increase the number of poor people or poor people

will become poorer. Catastrophic expenditures occur when the total medical expenditure of households exceeds (exceed) 40% of total household expenditure (VAN Doorslaer E 2007; Swadhin Mondal1 June 2010).

It is actually could potentially be cathastropik payment not only of modern medicine, but public spending on traditional treatment options much greater chance of creating an economic burden for families and society. This study found the traditional medical expenses greater than the expenditure incurred by government insurance. From the analysis based cluster, survivor category obviously have greater cost than accepting and hopeless category, both direct cost and indirect cost. Cost differences are also found in OOP and non-medical costs. How does this difference occurs is unknown and not excavated in this study. Likewise, traditional treatments that cause the cost of household expenditure (HHE) is not much revealed in this study. Required a more in-depth research and comprehensive to reveal the things mentioned above. The weakness of this study is the relatively small sample size and the less information obtained relate to the traditional medicine cost for the total economic burden of breast cancer disease , thus opens the possibility of under-estimated in calculating the breast cancer treatment total cost. This is because the approach is based bottom-up/patient oriented so that the COI Analysis and DALYs calculated in the same case, namely in the case of the deceased. Further research is needed to determine the Total Economic Burden of Breast Cancer to explore further about the cost both of modern medicine and traditional medicine.

5. CONCLUSION

This study concludes that the total breast cancer disease burden economic is big, so we need huge funds from the government and society to cope with the breast cancer disease. Due to the limitations of health finance, it is suggested that the promotion, prevention and early breast cancer detection became the main and priority alternative.

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