

The Economic Cost of Informal Caregiving for the Inpatient: The Case of Jimma University Referral Hospital, Jimma, Ethiopia

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Abstract

This study analyzes the economic cost of informally supplied health care with special emphasis on the labor market-related opportunity cost of informal caregiving for the inpatient at Jimma university referral hospital. The study used a primary data collected from 238 sample respondents. The empirical analysis was made by using the ordinary least squares (OLS) method of regression. The estimation results revealed that paid job experience, educational level, and employment status (with the exception of temporary employment) were statistically significant and positively related with the logarithm of the value or the cost of informal care through the wage difference. Quite unexpectedly, the number of external caregivers was also positively related to the logarithm of informal caregiving. On the other hand, the age of informal care recipient and the interaction term (female informal caregivers from urban area) are also statistically significant and negatively related to the logarithm of the value of informal care. These findings suggest that interventions and policy directions aimed at improving such as of the government through the policy of awareness creation, financial support, work accommodation and improvement of the accessibility and facility of the hospital.

Keywords: Ethiopia, Informal care, Informal caregiver, Economic cost, opportunity cost, Jimma.

1. Background

Informal care is one of the major types of care provided to those in need of assistance voluntarily. Different researchers have defined the term differently, Informal caregivers are people who provide unpaid help or arranges for paid help to a relative or friend because they have an illness or disability that leaves them unable to help themselves or because they are getting older or sicker. This kind of help could be associated with household chores, financial, personal or medical needs (Gould 2004). In other words, informal caregivers are individuals who provide ongoing care (assistance) for family members and friends in need of support due to physical, cognitive, or mental conditions without pay (CHPCA 2016).

On the basis of heterogeneity related to time investment, length of care, and number of care activities provided, informal care is defined as a non-market composite commodity consisting of heterogeneous parts produced (paid or unpaid) by one or more members of the social environment of the care recipient (Berg et al 2004).

Informal caregivers can be primary or secondary or part of an informal network of multiple informal caregivers such as siblings who share caring responsibilities for a parent. The different tasks of informal family care can be categorized into three groups: personal care with routine daily living activities; household work and emotional support; and administrative help (Triantafillou 2014). A unique feature of informal care is that it is economically invisible or it is not easily measurable in monetary value (Godhead & McDonald 2007). The demand for and supply of informal care is not limited to some specific people, country, or continent. It is one of the routines and ongoing socio-economic problem around the world.

In most countries, a major share of health care provided informally, and thus it is not reflected in social statistics. Despite the fact that informal caregivers serve mostly without any payment, however, care provision can still come at a certain cost: In particular, the provision of such cares is often time-consuming, mentally stressful, and physically exhausting, which can negatively affect the career and health of caregivers (Bettio & Verashchagina 2010).

Ethiopia is among countries with lowest health status in the world. This is mainly due to low levels of socio-economic development resulting in widespread poverty, low standard of living, poor environmental conditions and inadequate health services (MOFED 2007). The large number of inpatients accompanies this lower level of health status.

Although informal or voluntary care form a basis for much community-based health cares and a major aspect of program feasibility, relatively little economic information exists about such care. This is because informal care is a less visible part of total care in terms of costs as well as effects. Moreover, it has often been ignored in economic evaluations and subsequent policymaking (Berg et al 2004, Heger 2014).

Knowledge of the prevalence and value of informal work is of paramount importance to policy makers because the change in informal supply are often linked to public welfare and influence the social security balance sheet of a country. Although data about informal care can be obtained from insurance providers in countries that publicly support informal care, such data focus on care recipients (not on caregivers) and exclude those who do not apply for benefits or fit none of the entitlement requirements. As a result, most information on the magnitude of informal care is derived from surveys, often in the form of interviews with representative subsamples (Bauer & Sousa-Poza

2015).

A number of studies have been undertaken on the cost of informal caregiving for a specific type of patients, disabilities, the elderly and other categories of informal care recipients mainly focusing on developed countries (Butrica & Karamcheva 2014, Norma B et al 2010 and Unger 2013). However, there is no research, which has been conducted on the valuation of the economic cost of informal caregiving for the inpatients in Ethiopia.

The general objective of this paper is, therefore, to present new empirical evidence on the economic valuation of informally supplied health care with special emphasis on the labor market-related opportunity cost of informal caregiving for the inpatient. Specifically, the paper aims to investigate the impact of socioeconomic factors on the value of informal caregiving for the inpatient, examine the extent to which women principal informal caregivers, incur labor opportunity costs because of doing so compared to male principal informal caregivers and measure the vulnerability of principal informal caregivers for hospital-acquired infection.

The study seeks to provide pertinent information and insights to policymakers. Besides, we believe that the study will add value to the existing stock of knowledge and provoke or initiate for further study in the area as it reveals the difficulty in resolving the empirical question about the cost of informal caregivers for the inpatient.

2. Methods

2.1 Study design and setting

The cross-sectional study design was employed to gather qualitative and quantitative information pertinent to address the study objectives. The data analysis was carried out by using (STATA 13). Descriptive statistics and regression methods were also employed for data analysis.

Among the different valuation methods, this study employed the opportunity cost valuation method. Because, the alternative stated preference valuation methods face a lot of limitations like; ambiguity on the people valuation and what people are valuing, they are hypothetical, peoples are not calibrated to value non-market goods, the absence of a definitive yardstick against which to compare those measures. They are also based on the concept of willingness to pay (WTP) & willingness to accept (WTA) and it is difficult to conduct such kinds of study in Ethiopia because our religions and cultures do not allow us to consider our assistance or helps for inpatient, disables, elders and for the others in need of informal care in monetary value.

This study conducted on the cost of principal informal caregivers at Jimma university referral hospital. Jimma University specialized hospital is one of the oldest public hospitals in Ethiopia. JUSH is located in Oromia region, Jimma zone, Jimma town, 352 kilometers to the southwest of the capital of Ethiopia (JU 2016).

The hospital is the only teaching and referral hospital with a bed capacity of 590 in the southwestern part of Ethiopia and the hospital is providing services for approximately 15,000 inpatients, 160,000 outpatient attendants, 11,000 emergency cases and 4500 deliveries in a year coming to the hospital from the catchment population of about 15 million people. The customers of the hospital are from southwestern parts of Oromia, part of SNNP and from the Gambella region including the community of South Sudan refugee.

2.2 Data source and Sample Size Determination

Cross-sectional data were collected through questionnaire from a sample of the respondent or selected among informal caregivers for the inpatient at Jimma University specialized hospital. Besides, secondary data also gathered from the hospital's statistics office. The sample size was determined based on Yamane's formula (Yamane 1967). All of the respondents considered were principal informal caregivers and by definition, principal informal caregivers are more likely to provide most hours of informal care and to coordinate the care provided by other informal caregivers (Berg et al 2004).

Accordingly, the actual sample size estimated to be 238 drawn from the total population (principal informal caregiver) using stratified random sampling technique. There were twelve wards (departments) at Jimma University specialized hospital, which were considered as strata. Then individual respondents randomly selected from each of the twelve strata.

2.3 Study Variables

The dependent variable is the value of informal care provided by the principal caregiver and measured by the opportunity cost valuation method using the following formula

$$\text{Value of informal care (VIC)} = \beta_i W_i$$

Where; β_i is the number of hours spent on informal caregiving task by principal caregiver i and W_i is the hourly wage of the caregiver i . In cases where the principal caregiver is unemployed, a proxy for W_i was used. Accordingly, for informal caregivers who have been in the formal job categories or have been an employee the former hourly wage rate was used as a proxy for an hourly wage because the appropriate nominal wage rate for a caregiver of working age might be his/her previous wage rate. However, for those with no paid job experience, the minimum hourly wage rate for a government employee in Ethiopian (i.e., 4.04 Birr per hour) used as a proxy (MoPSHD 2017).

According to the report from the statistics office of Jimma University specialized hospital, the average length of stay of the inpatient during the year 2016/17 was 7.1 days. Consequently, calculations pertaining to the value of informal care made on a weekly basis.

We controlled for various covariates such as socioeconomic and demographic characteristics of the principal caregiver and that of the care-recipient as well; and the health status of the inpatient, the complete list of which is given in table one.

2.4 Specification of the model

$$\text{LnVIC}_i = \beta_0 + \beta_{1i}\text{HHS} + \beta_{2i}\text{EXP} + \beta_{3i}\text{AGEP} + \beta_{4i}\text{AGER} + \beta_{5i}\text{NEC} + \beta_{6i}\text{PE} + \beta_{7i}\text{SE} + \beta_{8i}\text{TE} + \beta_{9i}\text{DF} + \beta_{10i}\text{SEXCRM} + \beta_{11i}\text{I} + \beta_{12i}\text{P} + \beta_{13i}\text{S} + \beta_{14i}\text{C} + \beta_{15i}\text{DMM} + \beta_{16i}\text{HSS} + \beta_{17i}\text{HSM} + \beta_{18i}\text{HSSV} + \beta_{19i}\text{DUR} + \beta_{20i}\text{FFU} + U_i$$

Table 1: Description of the variable

<i>Variable</i>	<i>Description</i>
LnVIC_i	The log of the value of informal care of the principal informal caregiver <i>i</i> per week
HHS	Household size of the inpatient
EXP	job experience of the principal caregiver
AGEP	Age of the principal caregiver
AGER	Age of informal care recipient
NEC	Number of external caregivers
DF	Dummy variable which stands for female principal caregivers
SEXCRM	Dummy variable which stands for the male informal care recipient
DMM	Dummy variable which stands for married principal informal caregivers
DUR	Dummy variable which stands for principal caregivers from an urban area
FFU	The interaction term for female principal informal caregivers from an urban area
<i>Employment status (categorical variable) with the base group of unemployed respondents</i>	
PE	permanently employed (PE)
SE	self-employed principal caregivers (SE)
TE	temporarily employed (TE)
<i>Educational level (categorical variable) with the base group of the illiterate principal informal caregiver (I)</i>	
I	Primary education level (P)
P	Secondary education level (S)
S	Certificate/Diploma holder (C)
C	Degree and above degree holder (D)
<i>Health status of the inpatient (categorical variable) with the base group extreme health problem</i>	
HSS	Slight health problem (HSS)
HSM	Moderate health problem (HSM)
HSSV	Severe health problem (HSSV)

3. Empirical Results and Discussions

3.1 Descriptive Statistics

Of the total 238 respondents, 122 (51.26%) were from the rural area while 116 (48.74%) were from the urban area within the catchment of Jimma university referral hospital.

In terms of employment status, 67 (28.15%) of the informal caregivers studied were unemployed, of which 50 (74.6%) were found to be female. This indicates the presence of a high number of female unemployed principal informal caregivers. The remaining 171 (71.85%) are employed principal informal caregivers with different employment status like permanently employed, self-employed and temporarily employed respondents and out of the employed respondents 17.64% are female principal informal caregivers. According to the above data majority of those caregivers who are unemployed were females and this is typical of the attribute characterizing the state of caregiving tradition where female are considered better care givers and that the more unemployed they are the better they would be in assuming such roles.

The number of external caregivers per inpatient varied from zero to seven persons with a mean of 0.954 (roughly one person per care-recipient). Our findings further revealed that inpatients from a reach family are on average better cared for with more than one principal informal caregivers per inpatient; while from low-income, families would on average have one and the only principal informal caregivers. The household size of the inpatient varies from 2 - 16 with a mean and standard deviation of 5.33 & 1.90 respectively and according to the t-test and coefficient of correlation result there is no correlation between the number of informal caregivers and household size.

In terms of educational background, 76 (31.93%) are illiterate or they are not able to read and write. Similarly, those who attained the primary school level are 79 (33.19%) of the total respondents and those who attained the

secondary school level are 36(15.13%) of the total respondents. There are also respondents with certificate, diploma and degree level. Regarding the gender composition of principal informal caregivers many kinds of literature show the dominance of women informal caregiving activity but according to our own survey result out of the total respondents the majority which is 146(61.34%) of them are male principal informal caregivers for the inpatient while female principal informal caregivers are 92(38.66%) of the total respondents. This may be a different story if this research were conducted on the cost of home-based informal caregiving.

Of the whole sample, the minimum age of informal care recipient is 0.008 years (three days/ newborn baby) old infant and the maximum is 98 years old informal care recipient with a mean and standard deviation of 25.29 & 20.75 respectively. On the other hand, the age of principal informal caregivers varies from 17 - 75 years. The paid job experience is also varying from respondents to respondents and specifically, it varies from 0 to 50 years of job experience.

As the cost of informal caregiving for the inpatient is the central theme of the study. Even if there are five categories in the health status. We have only inpatients with a slight health problem, moderate health problem, severe health problem and informal care recipient with an extreme health problem and this is normal. because the target group of the study is the informal caregivers for the inpatient and by definition, there will be no inpatient with zero health problem.

The paid work income of the principal informal caregivers highly varies compared to the hours spent on informal caregiving tasks. According to the survey result, the minimum monthly paid work income of the respondent is 0 (for unemployed) and the maximum one is 15,000 birr (of permanently employed) with the mean and standard deviation of 1774.041 Birrand 2121.819 respectively. However, the hours spent on informal caregiving task is relatively common for all types of the informal care recipient.

The value of informal care per week varies from Birr 70(of the temporarily employed respondent) to Birr 3,500 (of the permanently employed respondent) with the mean of Birr 483.4586.

Table 3: The average value of informal care by gender

Unit/Gender	Male	Female
VIC per week	541.9803 Birr	390.5873 Birr

According to the principal informal caregivers' self – reported data, out of the total respondents 30 (12.60%) of them are affected by pain associated with common cold, muscular aches, backaches and they consider this pain as the result of hospital-acquired infection. This result shows the higher vulnerability of principal informal caregivers for hospital-acquired infection and it is highly related to the hygiene and hostel of the hospital.

Like most of the Ethiopian hospitals, Jimma university referral hospital did not give that much attention to informal caregivers. Out of the total respondents, 88(36.97%) are not satisfied by the treatment and service of the hospital for informal caregivers. while the rest 150(63.03%) are satisfied by the service of the university hospital for informal caregivers. But from our discussion with the focus group, we observe that most of our respondent accept the burden as their fortune and even they do not want to blame on the hospital or on another responsible body.

3.2 Econometric Analysis

Before the regression result interpretation, we have done different statistical tests like heteroscedasticity test (Breusch-Pagan test), multicollinearity test (Variance Inflation Factor **VIF**), omitted variable test (Ramsey RESET test), model specification test (link test) and significance tests like; t-test, F-test.

Most of the times models estimated with cross-sectional data affected by the problems of heteroskedasticity. When there is heteroskedasticity, the OLS method is not the most appropriate because the estimators obtained are not the best, i.e. the estimators are not BLUE in addition the covariance matrix of the estimators obtained by applying the usual formula is not valid when there is heteroskedasticity (and/or autocorrelation). Consequently, the t and F statistics based on the estimated covariance matrix can lead to erroneous inferences.

Table 4: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity			
Variables: fitted values of LnVIC	chi2(1)	= 30.47	There is Heteroskedasticity problem
Ho: Constant variance	Prob > chi2 =	0.0000	

In short, the above Breusch-Pagan tests suggest the presence of heteroskedasticity in our model. By default, Stata assumes homoskedastic standard errors, so we need to adjust our model to account for heteroskedasticity. To do this we use the option robust in the regress command and robust regression will adjust our model to account for heteroskedasticity.

Again, an important assumption for the multiple regression models is that independent variables are not perfectly multicollinearity. Multicollinearity is a case of multiple regression in which the predictor variables are themselves highly correlated. One of the major problems of multicollinearity is that the individual P values can be

misleading (a P value can be high, even though the variable is important). The second problem is that the confidence intervals on the regression coefficients will be very wide (Paul, R. 2017).

Table 5 :Variance Inflation Factor

Variable	VIF	1/VIF	Variable	VIF	1/VIF
DI	3.97	0.108900	DSE	2.72	0.367540
DP	8.63	0.115817	DUR	2.66	0.376169
DS	4.38	0.228373	DHSSV	2.23	0.449042
DPE	4.29	0.232950	DC	2.05	0.487607
EXP	3.84	0.260362	DMM	1.45	0.691833
DHSS	3.53	0.283394	DTE	1.31	0.761137
FFU	3.29	0.304133	AGER	1.29	0.773917
DHSM	3.29	0.304373	NEC	1.21	0.825052
AGEP	3.21	0.311787	HHS	1.18	0.850628
DF	2.90	0.344766	SEXCRM	1.18	0.889864
Mean VIF.....3.19					

A VIF > 10 or a 1/VIF < 0.10 indicates trouble. In our case, all VIFs are below ten and the mean VIF is 3.19, as a result, there is no multicollinearity problem.

If we miss out an important variable it does not only mean our model is poorly specified it also means that any estimated parameters are likely to be biased as result testing for omitted variable bias is important for our model. In order to know the presence of an omitted variable in our model, we used Ramsey RESET test.

Table 6: Ramsey RESET test using powers of the fitted values of LnVIC

Ramsey RESET test using powers of the fitted values of LnVIC		
Ho: model has no omitted variables	F (3, 214) = 2.51 Prob > F = 0.0595	The model has no omitted variable bias

The null hypothesis is that the model does not have an omitted-variables bias, the p-value is 0.0595 higher than the usual threshold of 0.05, so we fail to reject the null and conclude that we do not need more variables.

The model also has good explanatory power: R² reported as 0.6508, meaning that approximately 65.08 % of the total sample variation of the log of the value of informal care is explained by the independent variables included in the model.

The t- statistics were also calculated, with the null hypothesis that a parameter is zero, which means that the estimated variable has no effect on the dependent variable given that the other variables are in the model. From the above robust OLS regression, the dummy that stands for Certificate/ Diploma level, Degree and above degree educational level, Self-employed are statistically significant at the level of 1%. On the other hand, a dummy variable that stands for of primary educational level, Secondary educational level, Job Experience, Age of care recipient, permanently employed respondent, temporarily employed respondents and Caregiver from an urban area are statistically significant at the level of 5 %. Whereas, a number of external caregivers and the interaction term (female*urban area) are statistically significant at the level of 10%.

On the other hand, variables like household Size, the age of caregiver, a dummy of female caregivers, a dummy of the male care recipient, a dummy of married caregiver, a dummy of slight health problem, a dummy of moderate health problem and a dummy of an extreme health problem are statistically insignificant.

With 95% confidence, we can say that the variable paid job experience, educational level, employment status (except for temporarily employed respondents) and the number of external caregivers is positively related with the logarithm of the value of informal care. On the other hand, the age of informal care recipient and the interaction term (female from urban area) were negatively related to the logarithm of the value of informal care.

Table 7: OLS, Robust regression result

<i>Robust regression result</i>					
* Statistically significant at the level of 1% Number of obs = 238					
** Statistically significant at the level of 5% $F(20, 217) = 25.34$					
*** Statistically significant at the level of 10% $Prob > F = 0.0000$					
<i>R-squared = 0.6508</i>					
<i>Root MSE = .38039</i>					
<i>D stands for the dummy variable</i>					
LnVIC	Coef.	Std. Err.	t	P>t	Significance
Household size	.0135481	.0154061	0.88	0.380	
Job experience	.0150993	.0048653	3.10	0.002	**
Age of caregiver	.0030381	.0033972	0.89	0.372	
Age of care recipient	-.0038735	.0013954	-2.78	0.006	**
no of external caregivers	.0530841	.0294897	1.80	0.073	***
Employment status (categorical variable)					
permanently employed	.2999512	.1099688	2.73	0.007	**
self employed	.3113555	.0787262	3.95	0.000	*
temporarily employed	-.5198813	.199993	-2.60	0.010	**
D of female care givers	.0295701	.0720233	0.41	0.682	
D of male care recipient	-.0312071	.0534614	-0.58	0.560	
Educational Background (categorical variable)					
Primary level	.1791805	.0637422	2.81	0.005	**
Secondary level	.351571	.1091126	3.22	0.001	**
Certificate/ diploma level	.4993913	.1406101	3.55	0.000	*
Degree and above degree	1.044354	.183352	5.70	0.000	*
D of married care giver	.0803971	.0716934	1.12	0.263	
Health status of the informal care recipient (categorical variable)					
Slight health problem	.0750794	.099569	0.75	0.452	
Moderate health problem	-.047035	.0976328	-0.48	0.630	
Sever health problem	-.0304732	.1121303	-0.27	0.786	
D of caregiver from urban (female*urban)	.3038221	.1144845	2.65	0.009	**
(female*urban)	-.2185009	.1193041	-1.83	0.068	***
Constant(intercept)	5.03386	.1903079	26.45	0.000	*

3.3 Interpretation of the coefficient

Other things remain constant the opportunity cost or the value of informal care per week (which is measured in Birr) of the principal informal caregiver with one extra year of experience is greater than with that of the others by 1.50%. Alternatively, we can say that as the job experience of the principal informal caregiver increase by one year on average his/her value of informal care per week will increase by 1.50%.

Age of the informal care recipient (the inpatient) is statistically significant at 5% and it has a negative correlation with the value of informal care. As the age of informal care recipient increase by one year on average, the opportunity cost (value of informal care per week) of principal informal caregiver for the inpatient will decrease by 0.387%.

As the number of informal caregiver for the patient increase by one person on average the value of informal care will increase by 5.30%. This result needs further study, but from our observation, informal care recipient from high-income level households has a large number of informal caregivers compared to informal care recipient from low-income household.

From the four employment status category, the unemployed principal informal caregiver considered as the reference group and all the remaining groups compared with them. According to the employment status categorical variables coefficient, if the principal informal caregiver is unemployed on average his/her opportunity cost (value of informal care per week) will be lower from permanently employed and self-employed respondents by 29.99% and 31.13% respectively. On the other hand, if the principal informal caregiver were temporarily employed then his/her opportunity will be lower than with that of unemployed principal informal caregivers by 51.98%.

Within the educational level, we have five categories, which include illiterate, primary educational level, secondary educational level, certificate/diploma level and principal informal caregivers with a degree and above degree educational level. In the above OLS regression, illiterate principal informal caregivers considered as the base group and all other principal caregivers with the remaining educational levels were compared with them.

Holding other things remain constant, the value of informal care provided by an illiterate principal informal caregiver is lower from the value of informal care provided by informal caregivers with primary, secondary, certificate/diploma and degree and above degree level educational background by 17.91%, 35.157%, 49.939% and 104.435% respectively.

As it is presented in the methodology part of this study, Jimma university referral hospital provides its service for both the urban and rural part of the catchment area population. This study found that the area of principal informal caregiver is statistically significant at 5%. Other things remain constant if the principal informal caregiver is from the urban area then his/her value of informal care per week will be higher than with that of principal caregivers from the rural area by 30.38%.

Variables like household size, the age of caregiver, the gender of the care recipient, marital status of caregiver and health status of the informal care recipient and the gender of principal informal care recipient are statistically insignificant. However, the interaction of the area and the gender of principal informal caregiver which is the dummy, which stands for a female from an urban area, is statistically significant at 10%. According to the interaction term coefficient, if the principal informal caregiver is female from urban parts of the catchment area, quite unexpectedly, her value of informal care for the inpatient will be lower than with that of female principal informal caregivers from the rural area by 21.85%.

4. Conclusion and Policy Implication

4.1 Conclusion

Generally speaking, in Ethiopia, informal caregiving is not a new concept practically but it seems a new theoretically. There is no government policy which considers the burden of principal informal caregiver and the service which is provided by Ethiopian hospitals did not consider the need of principal informal caregivers. Totally, we can say that there is no good environment for informal caregivers in Ethiopia and we need to change this situation by promoting the government and non-government organization to have policy and strategies regarding principal informal caregivers. For example, the Ethiopian government has a five-year growth and transformation plan (GTP) which include the improvement of the health sector. Even if it is difficult to achieve such objective without the active involvement of the principal informal caregivers, the role and importance of informal caregivers did not mention within the health section of the Ethiopian growth and transformation plan. Therefore, whenever we plan to achieve something in the health sector we need to clearly state the role of principal informal caregivers and we need to help them.

4.2 Policy Recommendations

There are different types of caregivers who provide informal care for different types of inpatients and the diversified nature of informal caregiving followed by the diversified need of support from the community, government and non-government organizations. Based on the findings of the study and by considering the experience of developed countries the following policy recommendations expected to address the needs of principal informal caregivers. The Ethiopian federal government can provide vital leadership by awareness creation and respite care, policy related to workplace accommodation through leaves for caregivers and flexible work arrangements, improving the accessibility and the facility of hospitals and financial assistance through caregiver's allowance, cash-for-care benefits to the inpatient and unemployment benefits for caregivers.

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