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DETERMINANTS OF POVERTY OF ZOBA MAEKEL OF ERITREA: A HOUSEHOLD LEVEL ANALYSIS

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Abstract

This paper uses household level data collected from November 2010 to December 2011 for 303 respondents to examine probable determinants of poverty status employing descriptive analysis and Probit models. The descriptive result of mean per capita food expenditure (MPKFE) in ZobaMaekel of Eritrea found that all the households' heads are poor. The result of Probit analysis shows that poverty status is strongly associated with almost all variables used. Education level, type of resident, size of land, number of meal, remittance, access of credit from relatives, credit institutions, opinion to credit, rain fed crop, irrigated crop, income from agriculture and income from -non-agriculture were found to be negatively associated with food self-sufficiency as a proxy of poverty. However, family number, number of children, children at school age and rent of land highly positively related to poverty. For instance, higher levels of educational attainment will provide higher levels of welfare for the household. Education is not sufficient condition to escape from poverty. This indicates that there are other factors which affect poverty of a household in conjunction with education. There is a need for providing complementary factors alongside with education to alleviate poverty. Remittance is a good indicator of poverty, showing strong family ties within Eritrean society, the fact that Eritrea does not have social security system it may help to pursue policies which foster cultural ties and family networks as part of poverty alleviating endeavor. Polices to enhance social capital should be stressed more.

Key Words: *Determinant of poverty, Eritrea, ZobaMaekel, MPKFE, Probit model*

1. Introduction

Eritrean economy, like many African nations, is largely based on subsistence agriculture, and 60 per cent of the population relies for food and income on agricultural activities such as crop and livestock production or fishing, with an annual per capita income of US$150 in 2003 and a Human Development Index ranking of 155 out of 175 countries (International Fund for Agricultural Development [IFAD], 2012).

In Eritrea, the poor constitute about two-thirds of the population of the country and slightly more than one-third of them are extreme poor i.e. below the poverty line. The incidence of poverty is slightly higher among women. About 65 per cent of the poor live in rural areas and the incidence of poverty in Asmara is slightly more than 50 per cent. The highest incidence of poverty in the country prevails in small towns with 81 per cent of the

population below the poverty line. The proportion of the populations living below the national poverty line was 53 per cent during 1993-95. The comparable figure for 2001-03 was 66 per cent. These figures take into account food and non-food aid. On the face of it, the incidence of poverty has increased. But this increase has to be seen in context; that is, in light of the adverse consequences of the border war and the severe drought that hit Eritrea (United Nation Development Programme [UNDP], 2012).

The main aim of this paper is to analyses determinants of poverty of ZobaMaekel (Central Zone) of Eritrea. The study should help the government to realize its poverty reduction goals, by laying the foundation for analytical work.

2. Study area- ZobaMaekel (Central Zone) of Eritrea

ZobaMaekel is one of the six administrative Zobas of Eritrea. It is located in the central part of the country with longitude of 38^0 41' 36" - 39^0 3' 00" East and Latitude 15^0 34' 36" North. It shares boarders with ZobaAnseba in the North, ZobaDebub in the South, Zoba Northern Red Sea in the East and Gash Barka in the West. This Zoba is divided into 4 Sub-Zobas namely Asmara, Gala-Nefhi, Berik and Serejeka; with 59 administrative regions and 89 villages. The study was carried out in sub Zoba Gala-Nefhi, Berik, and Serejeka of ZobaMaekel.

ZobaMaekel (central) is densely populated and according to the statistical figures of 2008, the number of population is 591,368 consisting of 139,921 households; out of which 27 per cent of the region's population is engaged in agriculture, 23.5 per cent in trade and services, 18 per cent in manufacturing and handicrafts, 7.5 per cent in civil service, and 24 per cent in casual labor (ZobaMaekel Administration [ZMA], 2009).

The altitude of ZobaMaekel ranges from 1300 to 2610 meters above sea level. Based on altitude the region can be divided into three areas, namely highland, midland and sub-humid escarpment. Highland escarpment includes sub-ZobaBerik and large parts of sub ZobasSerejeka, Gala Nefhi and Asmara 2000-2610 meters above sea level. The main crops that grow in these areas are wheat and barley. Other crops such as "taff", maize, and pulses are also grown in this area. Cattle, sheep, goat, donkey and poultry are the main livestock in this area. According to the data obtained from the Ministry of Agriculture (MOA), the highland roughly constitutes about 90 per cent of the total area in the ZobaMaekel. Midland (the elevation ranges from 1660 to 2000 meters above sea level) covers some parts of the Sub Zobas Gala Nefhi and Serejeka. The midland area comprises of about 7 per cent of the total area of the ZobaMaekel. The sub-humid escarpment (the altitude is between 1300 and 1600 meters above sea level) is found at the base of the escarpments and the extreme end of the western part of Sub-Zoba Gala Nefhi and eastern part of Sub-ZobaSerejeka. The sub-humid escarpment constitutes about 3per centof the total area of ZobaMaekel (ZMA, 2009; MOA, 2010). Figure 1indicates the Map of Eritrea and the study area.
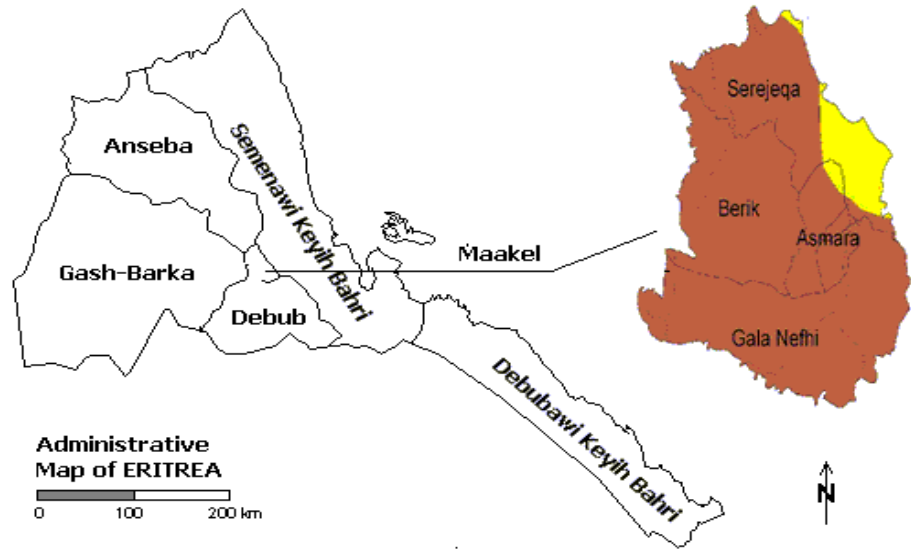
Figure 1: Map of Eritrea: Maekel region indicted as a Central
Source:www.en.wikipedia.org and ZMA (2009).

The cropping calendar in Gala Nefhi and Berik are similar. However, in Serejeka the cropping calendar is different because of the influence of climate from the Green belt Zone. The land preparation, planting, harvesting and weeding of crops is the same. The planting date depends on the crop varieties, soil type and type of landraces used. Farmers would prefer to plant early in a light soil because of poor water holding capacity and relatively late to the black soil due to better water holding capacity (Woldeamlak & Haile, 2012).

3. Literature review

Poverty is the non-existence of food, shelter, money and clothing that occurs when people cannot satisfy their basic needs. Poverty can be understood simply as a lack of money, or more broadly in terms of barriers to everyday life (Haughton & Khandker, 2009).

Absolute poverty or destitution refers to the state of severe deprivation of basic human needs, which commonly includes food, water, sanitation, clothing, shelter, health care, education and information. Relative or moderate poverty is defined contextually as economic inequality in the location or society in which people live (InstitutoNacional de Estadistica [INDE], 2009; World Bank, 2011). For most of history poverty had been mostly accepted as inevitable as traditional modes of production were insufficient to give an entire population a comfortable standard of living (Paul & Wells, 2009).

According to the World Bank quick appraisal group, absolute poverty line is "the minimum cash and non cash expenditure needed to be made by a person or household in order to be able to consume a minimum number of calories (food) plus a small number of essential nonfood items such as housing and other essential commodities" (World bank, 1996). The World Bank group also calculates poverty lines with and without food aid, original poverty line minus the amount of food aid received by a household. Using this definition they calculate poverty lines by region and at national level.

There are basically two approaches in modelling determinants of poverty. The first approach is the employment of consumption expenditure per adult equivalent and regress it against potential explanatory variables (Geda, Jing, Mwabu, & Kimenyi, 2005). Using this

approach Arneberg and Pederson (2001) report that household characteristics and education are the main factors which affect living standard in Eritrea. Moreover they find out that transfer payment from relatives abroad is a significant contributor to the welfare of a society. From their analysis they conclude that education is the most important factor for the way out of poverty. The second approach is to directly model poverty by employing a discrete choice model. The analysis then proceeds by employing binary logit or probit model to estimate the probability of a household being poor conditional up on some characteristics. In some cases also the households are divided into three categories: absolute poor, poor and non-poor and then employ ordered logit or ordered logit model to identify the factors which affect the probability a household being poor conditional up on set of characteristics.

Fissuh and Harris (2004), used Dogit Ordered Generalized Extreme Value (DOGEV) model for modelling determinates of poverty in Eritrea by employing Eritrean Household Income and Expenditure Survey 1996/97 data. Accordingly, they found that education impacts welfare differently across poverty categories; household size is not the same across poverty categories; unemployment was found to be positively associated with poverty; remittances, house ownership and access to sewage and sanitation facilities were found to be highly negatively related to poverty.

4. Research methodology and Data

4.1. Sample design and data collection

Primary data were used in this study. Semi-Structured questionnaires were used in the collection of primary data with the household being the unit of analysis. A questionnaire was administered according to Sub-Zoba to collect quantitative data on households. A total of 120 households were randomly selected from each Sub-Zobafor the household interview (120 households x 3 Sub-Zoba= 360). Hence, a total of 360 households were taken for the interview. Each sub-Zobas were represented by 120 samples to give equal chance of representation in the study as accurate population census is not available in the region. In turn, the number of samples from each "Kebabi" was weighed based on the number of household in the village. Out of the planned 360 households, a total of 303 households have responded to the interview while 57 samples were not present during the interview due to various personal reasons, of which 63 per cent were from Galanefhi, 32 per cent from Berik and the rest of 5 per cent were from Serejeka. The number of respondents from Serejeka, Berik, and Galanefhi are 117, 102, and 84 respectively. The number of households of the sub-Zobas and the "Kebabi" selected for interview are shown in Table 1.

Two-stage sampling technique was adopted, such as the Probability Proportional Size sampling technique was used in the first stage in the selection of the "Kebabi" followed by the second stage where the selection of households was done using simple random sampling in each selected "Kebabi". Thus, rural "Kebabi"s was taken as the primary sampling units (PSU's). Household heads within the sampled PSU's were taken as secondary sampling units (SSU's). The sample of "Kebabi"s were allocated among sub-Zobas proportional to the number of households within each "Kebabi" which implies that the "Kebabi" with higher household number had higher chance to be included in the sample than those with lesser number of households. It should be noted that all sub-Zobas were represented in the sample by at least one "Kebabi" and within the "Kebabi", the households were selected using systematic simple random sampling technique. Information was collected on income, sex and expenditure and other characteristics of household head from November 2010 to December 2011.

Table 1. Villages selected for the survey in Zoba- Maekel

Sub-Zoba	"Kebabi"	Village	No. Of households	Randomly selected	No. of respondents
Gala-Nefhi	Merhano	Merhano	900	120	84
	Adiarada	Adiarada	246		
	Himbirti	Himbirti	1550		
		Adomzemat	230		
	Selaedaero	Selaedaero	300		
Berki	Tseazega	Tseazega	1471	120	102
	Hazega	Hazega	600		
	Adighebru	Adighebru + Adi-Tekaly	640		
	Ametsi	Ametsi	360		
Serejeka	Shemanugus Tahtay	Shemanugus Tahtay	600	120	117
	Weki-Zager	Weki-Zager	587		
	Kwazen	Kwazen	960		
	Shemaneguse Laealy	Shemaneguse Laealy + Mekerka	520		
Total			8764	360	303

Note: "Kebabi" represent village's administration

4.2. Variable influencing Poverty

The factors considered to influence sufficiency of food production (SF) as a proxy of poverty in this study are: type of resident (TR), family number (FN), education level (EL), income from agriculture (IFA), income from non- agriculture (IFNA), number of children (NCH), children at school age (CSA), assets (ASS), size of land (SOL), number of meals (NOM), relatives (REL), rental land (REN), farm produce (FPR), remittance (REM), credit institutions (CRI), opinion to credit (OCI), rain fed crop (RFC) and irrigated crop (ICC). Table 2 shows the expected signs of influence the hypothesised variables will have on sufficiency of food production (SF).

4.3. Analytical techniques

Descriptive analysis and Probitmodel were used to analyze factor affecting poverty situation of Zoba-Maekel households of Eritrea.

4.3.1. Descriptive analysis

Poverty line was computed for this based on relative poverty line, i.e. mean per capita food expenditure (MPKFE) for the respondent, while two-third of MPKFE was also estimated for the comparison reason. Hence, any household head that had below or equal of two-third of MPKPE was considering poor, while a household head with above two-third of MPKFE was consider non- poor.

Table 2. Variables influence poverty, measurement index, expected signs, mean and Standard deviation (Std. Dev)

Variables	Measurement index	Expected sign	Mean	Std Dev
Dependent variables				
SF	It takes a binary response of 1=yes, 0=no 1=indicate farmers capable of enough food in good season to feed their family and 0= otherwise		0.5	0.5
Independent variables				
TR	Type of residence	(-)	2.9	0.5
FN	Number of people living in a household	(+)	6.7	2.8
EL	1 if respondent has no education ; 2 primary- not completed; 3 primary completed; 4 secondary-not completed; 5 secondary completed & 6 higher than secondary	(-)	2.3	1.3
IFA	Income from agriculture	(-)	5.0	2.7
IFNA	Income from non-agriculture	(-)	3.0	2.4
NCH	Number of children	(+)	10.4	8.7
CSA	Children at school age	(+)	3.0	1.5
ASS	Assets possessed	(-)	3.0	0.2
SOL	Size of land	(-)	0.3	0.5
NOM	Number of meals	(-)	1.4	5.6
REL	It takes a binary response of 1=yes, 0=no	(+/-)	0.3	1.1
REN	Rental land	(+)	0.1	0.3
FPR	It takes a binary response of 1=yes, 0=no	(-)	0.3	0.5
REM	It takes a binary response of 1=yes, 0=no	(-)	0.5	0.5
CRI	It takes a binary response of 1=yes, 0=no	(-)	3.1	1.7
OCI	It takes a binary response of 1=yes, 0=no	(-)	0.2	0.9
RFC	Rain fed crop	(-)	9103	11994
ICC	Irrigated crop	(-)	3665	5750

Source: Author's observations

4.3.2. Probit Model

In this study, the econometric model to use to identify factors influencing poverty is modelled as two decisions: either they are food sufficient or not. The dependent variable in the case of whether or not food sufficient is the binary responses and it takes a value of 1 if yes and 0 otherwise. Ordinary least square (OLS) could not be used for the estimation of the model as the dependent variable is binary. A Probit model also known as the Normit model is found appropriate to determine the factor(s) that influences poverty (Katchova & Miranda, 2004; Israel-Akinbo, 2012). The Probit Model is an econometric model where the regressed

variable is discrete (i.e. 0 or 1). Following Maddala (2001), the Probit Model is represented as:

$$P(\alpha_1 = 0) = \phi\left(\frac{-\beta_\alpha^1 X_1}{\sigma}\right) \tag{1}$$

Where "α_1" is the dependent variable if individual *i* answered 1=food sufficient (no poverty) and 0= not food sufficient (Poverty); "*P*" is a vector of respondent characteristics; "β"is a vector of coefficients and "ϕ" is the cumulative probability distribution.

5.1. Descriptive analyses

In this section we discuss mean per capita food expenditure (MPKFE). The MPKFE is derived by dividing food expenditure per capita adjusted for household size by respective respondents in the sample. As mentioned above, any household head that had below or equal of two-third of MPKPE was considering poor, while a household head with above two-third of MPKFE was consider non- poor. Unfortunately, all the household head represented in this study were found poor.

5.2. Probit Model

This section presents the estimated Probit model. This model discussed in the previous section was estimated using sufficiency of food production as a proxy of poverty as a dependent variable and explanatory or independent variables are: type of resident (TR), family number (FN), education level (EL), income from Agriculture (IFA), income from non- agriculture (IFNA), number of children (NCH), children at school age (CSA), assets (ASS), size of land (SOL), number of meals (NOM), credit access from relatives (REL), rental land (REN), farm produce (FPR), remittance (REM), credit institutions (CRI), opinion to credit (OCI), rain fed crop (RFC) and irrigated crop (ICC). The estimated results of the Probit model is presented in Table 3.

The result of the Probit model analysis shows that the coefficient of family number, number of children, children at school age and rent of land of household head is statistically significant and positively related to household's poverty. This result implies that the likelihood of a households becoming poor increases with the increase of positively related variables. For example, a likelihood of a households' becomes poor increases with an increase in the family number, number of children and children at school age of the household head. Family number (Household size) has significant effect on the welfare (poverty) of households be in line with the findings in the poverty literature (Lanjouw & Ravallion, 1995). This also implies that children are highly dependent on their parent. As it is observed from the respondent, mostly the income of household depends on the male households and if there is poor production in a given season, then the possibility of being poor is high.

However, the coefficient of education level, asset, type of resident, size of land, number of meal, remittance, credit from relatives, farm produce, credit institutions, opinion to credit, rain fed crop, irrigated crop, income from agriculture, income from non-agriculture were found to be statistically significant and highly negatively related to poverty. For instance, the coefficient of household level of education as measured by years of schooling is statistically significant and negatively related to poverty. This implies that household becomes less

vulnerable to poverty with an increasing educational attainment, i.e. the higher the years of schooling the lowers the odds that a household head will be vulnerable to poverty. However, education is not sufficient condition to escape from poverty. This indicates that there are other factors which affect poverty of a household in conjunction with education. There is a need for providing complementary factors alongside with education so as to alleviate poverty. Thus, promotion of education is central in addressing problems of poverty.

Table 3. Estimated coefficient for the Probit model of a households to poverty

Variable	Estimated coefficients	Std. Error	z-Statistics	Prob.
Constant	-1.344624	1.452539	-0.925706	0.3546
Type of resident (TR)	-0.257123	0.178252	-1.442475	0.1492
Family number (FN)	0.027391	0.100077	-0.273702	0.7843
Education level (EL)	-0.099548	0.074251	1.34071	0.18
Number of children (NCH)	0.014596	0.100283	-0.145547	0.8843
Children at school age (CSA)	0.040091	0.060857	-0.658763	0.51
Assets (ASS)	-0.006473	0.013083	-0.494731	0.6208
Size of land (SOL)	-0.012466	0.093612	0.133166	0.8941
Number of meals (NOM)	-0.546336	0.422509	1.293075	0.196
Relatives (REL)	-0.020424	0.204546	-0.099849	0.9205
Rent land (REN)	0.025953	0.037949	0.683893	0.494
Farm produce (FPR)	-0.357111	0.137352	-2.599966	0.0093
Remittance (REM)	-0.07219	0.278131	-0.259555	0.7952
Credit institutions (CRI)	-0.095585	0.229668	0.416187	0.6773
Opinion to credit (OCI)	-0.315015	0.199494	1.579073	0.1143
Rain fed crop (RFC)	-0.232351	0.095869	2.423628	0.0154
Irrigated crop (ICC)	-0.336641	0.154547	2.178246	0.0294
Income from agriculture (IFA)	-1.85E-06	9.51E-06	0.194313	0.8459
Income from -non-agriculture (IFNA)	-4.70E-05	1.80E-05	2.617602	0.0089
McFadden R-squared = 0.116915		Prob(LR statistic) = 0.003433		
LR statistic = 39.84096		Log likelihood =-150.464		

Source: Probit regression estimation using the software E-views 7

Credit availability and credit opinion is also statistically significant and negatively related to poverty. This implies that households with access to credit are less likely to be vulnerable to poverty. As increased access to credit market enhances household welfare through the provision of investment to boost household income as well as smooth consumption which could significantly influence a household's income by helping its members to tap economic opportunities, thereby assisting them to get out of poverty (Zeller, Braun, Johm, & Puetz, 1994; Binswinger & Khandker, 1995; Adugna & Heidhues, 2000).

In Eritrea, saving and Micro-credit program (SMCP) plays a crucial role to eradicate poverty and doing a noticed financial service for customers such as low-income families, immigrants under rehabilitation and bread winning women in rural areas as they have no

instant access to banks since 1996 with a view to fostering small-scale business activities, and thereby improve the livelihood of beneficiaries. The program also managed to change the opinion of the beneficiaries towards saving, sense of ownership and sustainability through individual, voluntary, and open-access savings accounts have proved most successful in attracting savers (Bahta, Groenewald, & Van Schalkwyk, 2006).

Asset is statistically significant and highly negatively related to poverty. This entails that if household's access to common pooled resources, the poverty level will decline. It also have a policy implication of promoting ownership of capital assets and raising livestock through less tax on agricultural capital goods and agricultural extension services.

Income from non-agriculture and irrigated land is negatively correlated with poverty. Some households having the resources such as: water pump, labor and capital do engage in the production of vegetables in farm land ranges from 0.5 hectare to 1.5 hectares in the study area. This enables them to get additional income. The same is true for some households, who enable work outside their farm such as: in livestock market as brokers and labor work like construction in capital city of Eritrea in Asmara.

Remittance from family at home (relatives) and Diaspora is highly negatively correlated with poverty in Zoba Maekel of Eritrea. The result of this study also is in line with the study by Fissuh and Harris (2004).Remittances from relatives within Eritrea or abroad are good indicators of poverty in Eritrea However remittance is not evenly distributed. Distribution of remittances mainly from relatives in Diaspora is inversely related to poverty. It is estimated that about one third of the population of Eritrea is in Diaspora (Arneberg & Pederson, 2001; Fissuh & Harris, 2004).

In Eritrea having relatives who can send money in Diaspora is a blessing. About half of the source of income for the well-off families is non labor income in the form of transfer payment (Arneberg & Pederson, 2001). This is not surprising given strong family ties with in Eritrean society. This is interesting result the fact that Eritrea does not have social security system it may help to pursue policies which foster cultural ties and family networks as part of poverty alleviating endeavor.

6. Summary, Conclusion and Recommendation

6.1. Summary and Conclusion

The study uses data from Zoba Meakel of Eritrean field survey 2011 to examine the determinants of poverty in Zoba Meakel of Eritrea. This paper employed descriptive and Probit model. From the descriptive analysis two-third of MPKFE found that all the household head represented in this study was poor.

From the Probit model analysis we found that the coefficient of family number, number of children, children at school age and rent of land of household head is statistically significant and positively related to household's poverty. On the other hand, the coefficient of education level, type of resident, size of land, number of meal, remittance, relatives, credit institutions, opinion to credit, rain fed crop, irrigated crop, income from agriculture, income from -non-agriculture were found to be statistically significant and highly negatively related to poverty. Higher levels of educational attainment will provide higher levels of welfare for the household. However, education is not sufficient condition to escape from poverty. This indicates that there are other factors which affect poverty of a household in conjunction with education. There is a need for providing complementary factors alongside with education so as to alleviate poverty. Therefore, investment in human capital along with other means of social protection/promotion could be instrumental for reducing household

poverty. Remittance from relative within Eritrea and Diaspora are a good indicator of poverty. This is noticed given strong family ties with in Eritrean society, the fact that Eritrea does not have social security system it may help to pursue policies which foster cultural ties and family networks as part of poverty alleviating endeavor.

6.2. Recommendation

Modeling, analysis and studying of poverty is not only improving the well-being of households head that are currently poor, but also preventing households from becoming poor in the future, a new forward looking perspective must be adopted such as an assessment of households' vulnerability to poverty. *Ex ante* strategies should be developed to prevent households from becoming poor as well as *ex-post* strategies to alleviate poverty for those already sunk in poverty. For example, in Eritrea, Saving and Micro-credit program (SMCP) is a financial service since 1996 with a view to fostering small-scale business activities, and thereby improves the livelihood of beneficiaries for customers such as low-income families, immigrants under rehabilitation and bread winning women in rural areas as they have no instant access to banks. Moreover, the program boost them build up assets as it smoothes income and consumption, enhances the purchases of inputs and productive assets as well as provide protection against risks. Furthermore, the non-poor but vulnerable households are most likely to benefit from some combination of prevention, protection and promotion which would give them a more secure base to diversify their production activity into higher-return and higher risk activities.

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