The Status of Toro Village in the Lore Lindu Region: Is it Really Exceptional? A Comparative Quantitative Study of Socio-Economic Indicators

Stefan Schwarze, Björn Schippers, Heiko Faust, Adhitya Wardhono, Robert Weber, and Manfred Zeller

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1. Introduction

The Collaborative Research Centre (SFB) 552 ‘Stability of Rainforest Margins’ (STORMA) has shifted its focus from the sub-districts of Palolo and Lore Utara to the village of Toro in the sub-district of Kulawi. This shift in attention was justified by a shift in the topic, from forest gardens to agrofforestry systems with cocoa. In Toro it is possible to study these types

of agroforestry systems 'in well suited plots' (STORMA, 2003). Another reason given was that the "Toro study area in the Kulawi valley turned out to be highly interesting in terms of socio-economic structure with straightforward agreements on forest use with the National Park" (STORMA 2003, p. 10). However, so far there has been no study which has investigated the socio-economic situation in the village of Toro in comparison with other villages near the Lore-Lindu National Park.

2. Objectives and research topics

The study aims to analyse the socio-economic situation in the village of Toro and compare it to the vicinity of the Lore-Lindu National Park. The results are particularly relevant for other projects within the STORMA framework, which also work in the village of Toro.

The 'socio-economic situation' is described through an analysis of the possession of assets as well as of other welfare indicators, which are then used to calculate a poverty index. We compared the results for Toro and the Lore-Lindu area (LLR) and tested, whether the observed differences are statistically significant.

In our analysis of the possession of assets we follow the asset classification proposed by Reardon and Vosti (1995), but without a spatial differentiation of physical capital. Additionally we differentiate explicitly the household members' access to social networks. Thus, the household's asset possession is classified as physical capital (land), human capital (household composition and education), and social capital (ethnicity, religion, and migration).

The welfare situation is characterised through a descriptive analysis of the variables which are used to compute the poverty index. These variables include three asset-related indicators, four dwelling indicators, and two consumption indicators.

3. Data sources

Sources of data are the 2004 census of Project A1[1] in the village of Toro and the 2004 household survey of Project A4[2]. During the census all 401 households living in the village of Toro have been interviewed. The Project A4 household survey interviewed 270 randomly selected households living in 12 villages in the vicinity of the Lore-Lindu National Park[3]. Details on the sampling frame and on the selection of villages and households are described in Zeller et al. (2002a). Because the number of households chosen in each stratum was not

[1] Project A1 is entitled Demographic change and its impact on land use.

[2] Project A4 is entitled Economic analysis of land use systems for rural households.

[3] For a map of the Lore-Lindu region see Figure 1 in the Appendix.

proportional to the stratum's share of the total population, sampling weights were applied. The following table shows the number of households surveyed in each of the selected villages, as well as their sampling weights.

Table 1: Sample villages and their sampling weights

Sub district	Village	Stratum	Number of households interviewed	Sampling weight
Lore Utara	Watumaeta	6	20	0.53
	Wuasa	10	27	0.86
	Wanga	6	17	0.53
	Rompo	6	16	0.53
Palolo	Sintuwu	8	25	0.63
	Berdikari	5	21	2.54
Sigi Biromaru	Maranata	3	32	1.35
	Pamdere	10	31	0.86
	Sidondo II	4	33	1.17
Kulawi	Bolapapu	9	32	0.68
	Lempelero	7	30	0.58
	Lawe	2	17	1.99

Source: Zeller et al. (2002a) and Schwarze (2004)

During both the census in Toro and the survey in the LLR, data was collected through standardised, formal questionnaires by teams of local enumerators. The data was entered and cleaned at UNTAD University, Palu.

4. Measurement of poverty

The welfare situation was characterised using a poverty index as a medium term welfare indicator. To generate the index we used a method developed by Zeller et al. (2002b) that employs principal component analysis (PCA) to select and eventually aggregate various indicators of poverty into a (0,1) normally distributed poverty index. In comparison with the conventional method of measuring per-capita expenditures and assess whether they are below a monetary poverty line, this index method allows to go beyond income poverty and to include – apart from monetary indicators such as asset values, food expenditures etc. – also non-monetary indicators of poverty. It is the latter group of indicators that enables us to

measure housing conditions, education, demography, subjective poverty as well as other dimensions of poverty such as social capital. In this paper, we combine indicators from several dimensions into an index of relative poverty. Our multi-dimensional approach for measuring poverty builds on recent research on relative and subjective poverty that seeks to go beyond (absolute) income poverty (see for example Filmer and Pritchett, 2000, Frey and Stutzer, 2002, Oswald, 1997, Pradhan and Ravaillion, 2000). Details of this method, including sampling and questionnaire design, are reported in Henry et al. (2003). The poverty index (PI) is calculated for each of the sample households as the sum of the z-scores of the indicators (z_i) times their weights (w_i):

$$(1) \qquad PI = \sum_{i=1}^{10} z_i \cdot w_i$$

The following table shows the 10 indicators selected by using PCA as well as their weights.

Table 2: Poverty indicators and their weights

Indicator	Weight
Asset related indicators	
Total value of electronic appliances	0.188
Total value of transportation assets	0.163
Number of television owned	0.188
Dwelling related indicators	
Type of walls	0.176
Type of floor	0.161
Type of roof	0.175
Access to electricity	0.179
Per capita expenditures on clothes and footwear	0.153
Food related indicators	
Number of months with food shortage	-0.086
The share of income spent on food	-0.117

Source: Abu Shaban (2001)

5. Asset endowment in Toro and the Lore-Lindu area

Before presenting the results concerning the poverty indicators we compare various important assets, which are not included in the poverty index. These assets are land, family labour endowment, education, ethnicity, religion, and immigration.

5.1 Land and land use

Land is the most important assets for rural households in the LLR, because crop production is the most important income activity. 96% of the households are involved in crop production and it contributes to 44% of the total households income (Schwarze, 2004).

The average area of land owned per household in Toro is 1.5 ha, which is significantly lower than the 1.8 ha per household in the LLR. Furthermore, in Toro we find significantly more households growing rice and cocoa, but less households cultivating coffee (see Table 3).Table 3

Table 3: Area of land owned (ha) and percentage of households growing paddy rice, cocoa, and coffee

	LLR		Toro	
	Mean	Mean rank	Mean	Mean rank
Area of land owned (ha)	1.8	399***	1.5	334***
% of households growing paddy rice	39	291***	75	421***
% of households growing cocoa	67	326***	90	393***
% of households growing coffee	26	403***	8	331***

*** statistically significant at 1%
Number of observations=671 (270 in LLR and 401 in Toro)
Source: Census of Project A1 and Project A4 household survey

5.2 Human capital

In this section we discuss differences in the household composition and in the level of education of the household members.

In Toro, households consist on average of 3.2 adults, which is significantly lower than the average number of adult household members in the LLR. However, the number of children and the dependency ratio[4] do not differ between Toro and the LLR (see Table 4).

Table 4: Number of adults, number of children, and the dependency ratio

	LLR		Toro	
	Mean	Mean rank	Mean	Mean rank
Number of adults	3.5	388***	3.2	343***

[4] The dependency ratio is the number of children divided by the total number of household members.

Number of children	1.6	372	1.6	356
Dependency ratio	0.6	358	0.6	367

*** statistically significant at 1%
Number of observations=671 (270 in LLR and 401 in Toro)
Source: Census of Project A1 (2004) and Project A4 household survey

Besides the availability of family labour, another important aspect of human capital is the level of education of household members. We distinguish three different aspects of education in our analysis: (1) never attended school (2) completed primary school or higher describing differences in primary education (3) completed tertiary school or higher describing participation in higher education.

The share of adult household members who never attended school is lower in Toro than in the LLR (see Table 5). Moreover, the share of household members who completed at least primary school is higher in Toro. These results suggests that the access to primary education is better in Toro than in the LLR. However, the share of household members who completed schools is lower in Toro, which indicates that access to higher education is better in the LLR than in Toro.

Table 5: Level of schooling of adult household members

	LLR		Toro	
	Mean	Mean rank	Mean	Mean rank
% of adults who never attended school	6	380***	2	350***
% of adults completed at least primary school	83	340***	89	382***
% of adults completed at senior high school	13	374*	11	354*

** statistical significant at 5%.* statistical significant at 10% Number of observations=671 (270 in LLR and 401 in Toro). Source: Census of Project A1 (2004) and Project A4 household survey

5.3 Social capital

Social capital is the access of household members to social networks and institutions. We focus on the access to networks, which are based on ethnic affiliation, religion, and immigration.

The ethnic composition in Toro is significantly different from the LLR. In Toro, more than two-third of the households are Kulawi, followed by groups originating in the south of Sulawesi (Bugis and Rampi), while less households are Kaili and Napu. In the LLR Kulawi and Kaili each make up 30% of the households (see Table 6).

Table 6: Ethnicity of the head of household

	LLR		Toro	
Heads of household …	Share	Mean rank	Share	Mean rank
% Kaili	33	445***	2	332***
% Kulawi	30	284***	67	423***
% Bugis/Rampi	7	339***	21	392***
% Napu	14	403***	1	356***
% other ethnic groups	17	393***	8	362***

*** statistical significant at 1%, Number of observations=671 (270 in LLR and 401 in Toro) Source: Census of Project A1 (2004) and Project A4 household survey

There are also significant differences in religion between the LLR and Toro. In Toro, 86% of the households are Protestant, whereas only about 14% are Muslim. In contrast, more than 35% of the households are Muslim in the LLR (see Table 8, Figure 5).

Table 7: Religion of head of household

	LLR		Toro	
Heads of household …	Share	Mean rank	Share	Mean rank
% Muslims	35	423***	14	345***
% Protestants	63	319***	86	403***
% other religious groups	2	377**	0	371**

*** statistical significant at 1%. ** statistical significant at 5%. Number of observations=671 (270 in LLR and 401 in Toro). Source: Census of Project A1 (2004) and Project A4 household survey

Moreover, the share of household-heads, who immigrated, is lower in Toro (49%) than in the LLR (42%). Investigating the year the migrants came to their village also shows significant differences between Toro and the LLR. In Toro, a high share of migrants arrived a long time ago, with a peak between 1966 and 1970. In contrast, the majority of the migrants in the LLR arrived after 1970, with a peak between 1996 and 2000 (see Table 9, Figure 6).

Table 8: Share of migrants and year of migration

	LLR		Toro	
Heads of household …	Share	Mean rank	Share	Mean rank
% who migrated in	49	387*	42	362*
% who migrated in 1950 or earlier	1	162**	5	170**
% who migrated in 1951 till 1970	14	145***	35	180***
% who migrated in 1971 till 1990	51	183***	34	155***
% who migrated in 1991 till 2000	34	176*	25	161*

*** statistical significant at 1%. ** statistical significant at 5 %. * statistical significant at 10%
Number of observations=671 (270 in LLR and 401 in Toro)
Source: Census of Project A1 (2004) and Project A4 household survey

6. Poverty indicators

6.1 Asset related indicators

Asset related indicators, which have been used to calculate the poverty index, are the value of transportation assets owed, the value of electronic assets owned, and the number of television owned. In Toro as well as in the LLR a high share of households do not possess any transportation or electronic assets (see Table 9) and therefore their value owned is zero. For this reason we divide the analysis into three parts: (1) Analysis of whether a household owns such assets or not; (2) Comparisons of the mean value owned, conditional of possessing assets; (3) Evaluation of overall differences in asset ownership.

In the LLR fewer households report that they possess transportation assets and electronics, but the households who own such assets possess more than households in Toro (see Table 9).

Table 9: Mean value owned, share of owners, and mean ranks of asset related indicators

	Mean value owned (IDR 1000)	Share of owners (%)	Mean value owned conditional on possession (IDR 1000)	Mean ranks
Transportation assets				
LLR	935	12***	7516***	363***
Toro	643	25***	2587***	402***
Appliances and electronics				
LLR	89	13***	689*	340***
Toro	186	34***	542*	418***
Television sets				
LLR	-	7	-	-
Toro	-	13**	-	-

*** statistical significant at 1%.** statistical significant at 5%.* statistical significant at 10%
Number of observations=671 (270 in LLR and 401 in Toro). Source: Census of Project A1 (2004) and Project A4 household survey

To evaluate whether households in Toro possess more assets than households in the LLR we compared the mean ranks, which for both assets are higher in Toro than in the research are.

A third asset related indicator is the number of televisions owned. The share of households owing at least one television is higher in Toro (13% compared to 7%). This relationship is statistically significant at the 5% level (see Table 9).

The statistical analysis revealed that households in Toro possess more of the asset related indicators considered than households in the LLR.

6.2 Dwelling related indicators

Within this category of indicators we considered the type of walls, type of roof, type of floor and the type of electricity connection. In the case of wall and roofing material, using a Mann-Whitney test reveals no statistical differences in mean ranks between Toro and the LLR (see Table 10). However, the flooring material used and the electricity connection in Toro is better than in the LLR.

Table 10: Mean ranks of the dwelling related indicators

Mean ranks	Walls	Roof	Floor	Electricity
LLR	374	387	340***	367**
Toro	384	382	418***	399**

*** statistical significant at 1%.** statistical significant at 5%
Number of observations=671 (270 in LLR and 401 in Toro)
Source: Census of Project A1 (2004) and Project A4 household survey

6.3 Food related indicators

Food related indicators, which have been used to calculate the poverty index, are: (1) the number of months with at least one day where the household did not have enough to eat, (2) the amount of money the household would spent on food (out of a hypothetical increase in income by IDR 25000).

In Toro the number of months with food shortage is significantly higher than in the LLR. In contrast, the amount of additional income spent on food is significantly lower in Toro indicating a better situation than in the LLR (see Table 11).

Table 11: Mean and mean ranks of food related indicators

	Number of months with food shortage		Money spent for food	
	Mean months	Mean ranks	Mean IDR 1000	Mean ranks
LLR	.72	294	19	454***
Toro	1.57	450***	16	338***

*** statistical significant at 1%
Number of observations=671 (270 in LLR and 401 in Toro)
Source: Census of Project A1 (2004) and Project A4 household survey

6.4 Clothing expenditures

The last indicator included in the poverty index are the per capita expenditures for clothing and footwear. In Toro they are more than two times higher than in the LLR (see Table 12).

Table 12: Per capita expenditures on clothing and footwear

	Mean (IDR 1000)	Mean rank
LLR	71	258***
Toro	151	475***

*** statistical significant at 1%
Number of observations=671 (270 in LLR and 401 in Toro)

Source: Census of Project A1 (2004) and Project A4 household survey

7. Poverty index

Using the just introduced ten indicators a poverty index was calculated. Table 15 shows the descriptive statistics of the poverty index for Toro and the LLR. In line with the analysis of most of the indicators also the poverty index is significantly higher in Toro than in the LLR.

Table 13: Descriptive statistics of the poverty index

	Minimum	Maximum	Mean	Standard-deviation
LLR	-1.97	2.26	-0.12*	0.83
Toro	-1.77	4.13	0.00*	0.88

* statistical significant at 10%
Number of observations=671 (270 in LLR and 401 in Toro)
Source: Census of Project A1 (2004) and Project A4 household survey

8. Conclusions

Our analysis revealed that in Toro: (1) households own less land (2) households grow more rice and cocoa but less coffee (3) better access to primary education, but poorer to higher education (4) ethnic and religious affiliation differs (5) the share of 'new' migrants is lower. From the analysis of the poverty indicators we can conclude that households in Toro are better-off compared to households in the LLR. This result is also confirmed by the analysis of the poverty index itself: it is significantly higher in Toro. The only indicator pointing into the opposite direction is the number of months with food shortage.

The results of this paper support the assumption of the STORMA research project, that the socio-economic status of Toro within the Lore Lindu region is exceptional. However, the extraordinary status of Toro has to be regarded against the background of a very heterogeneous Lore Lindu region. Environmental conditions, historical background, and infrastructure development vary widely in the area. The altitudes ranges from just above sea level to up to 2500 meters and rainfall varies from 500 – 2500 mm per year (Maertens, 2004). Taking the example of ethnic and religious affiliation, the sub district of Kulawi, where Toro is located, reveals a higher share of Christians due to early Christian evangelization of the

local ethnic groups and due to a lower share of Muslim migrants compared to other sub districts (Weber et al., 2003; Weber, in print). Thus, the results presented for Toro could also reflect the situation in other villages in the LLR, even though our results reveal the extraordinary socio-economic situation in Toro compared to the 'average' LLR.

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10. Appendix

Figure 1: The Lore-Lindu region

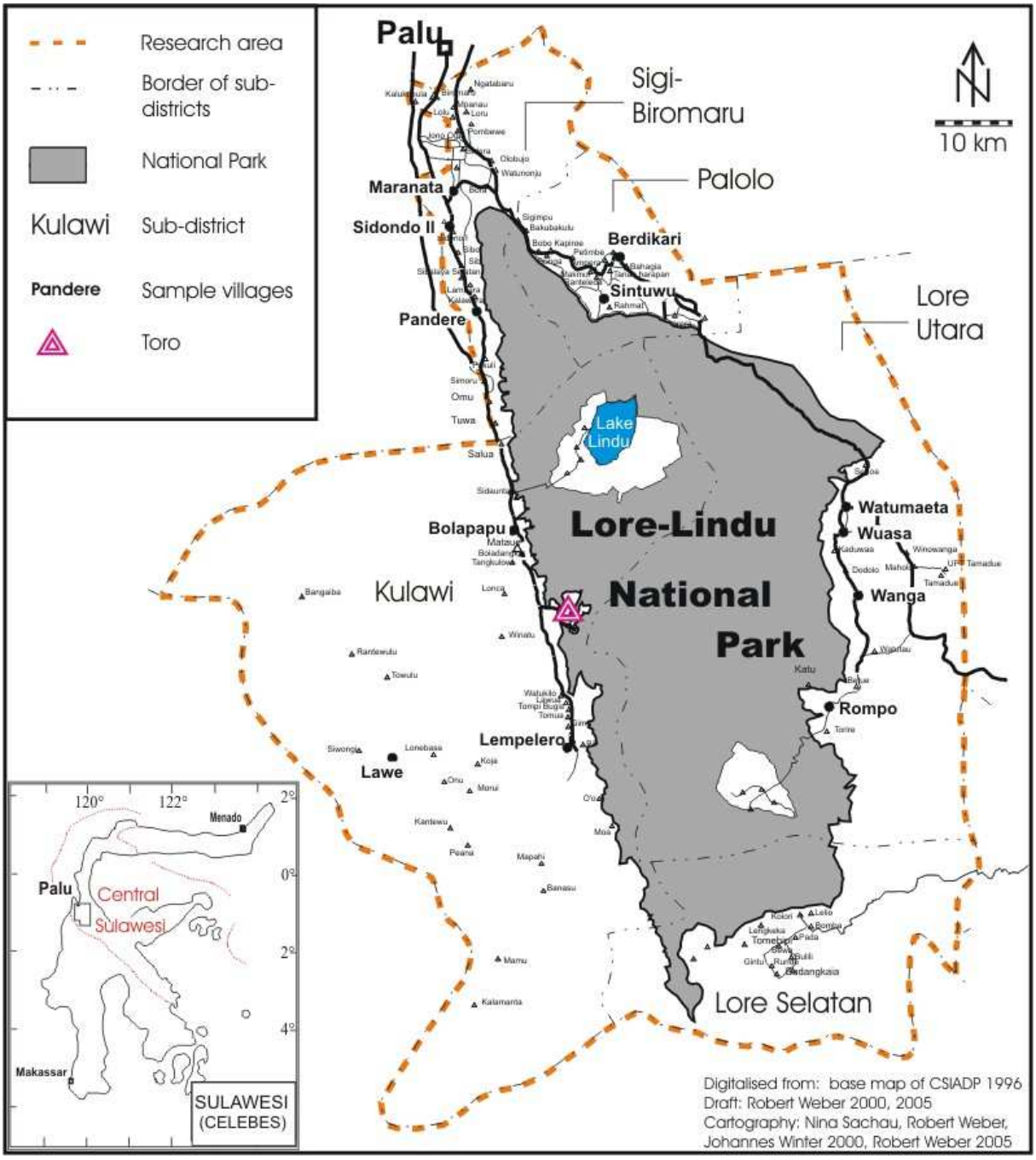
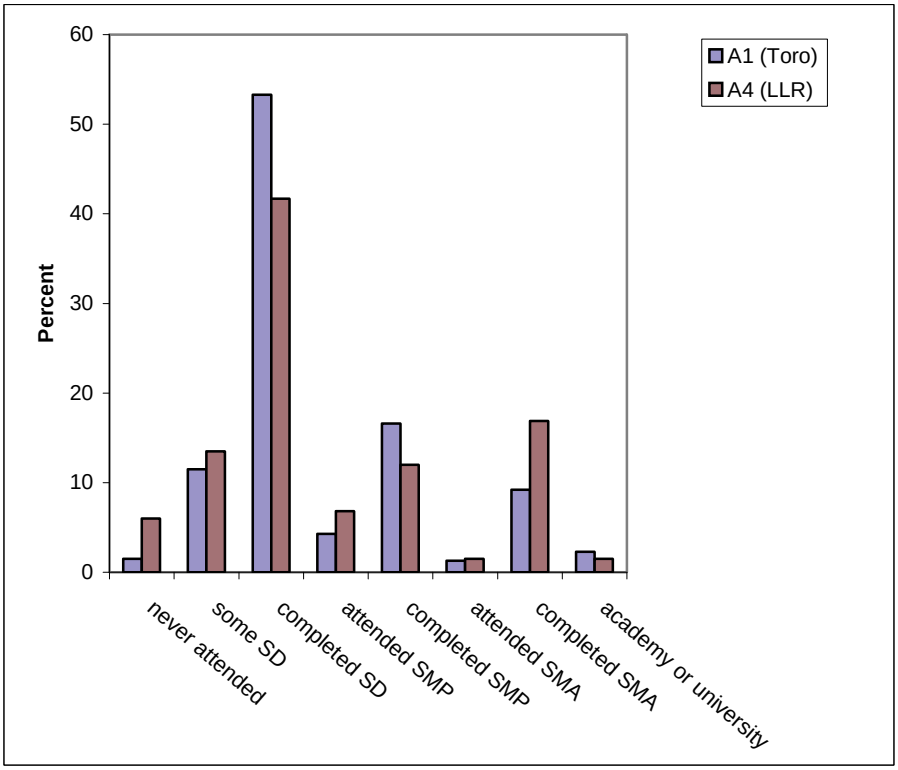
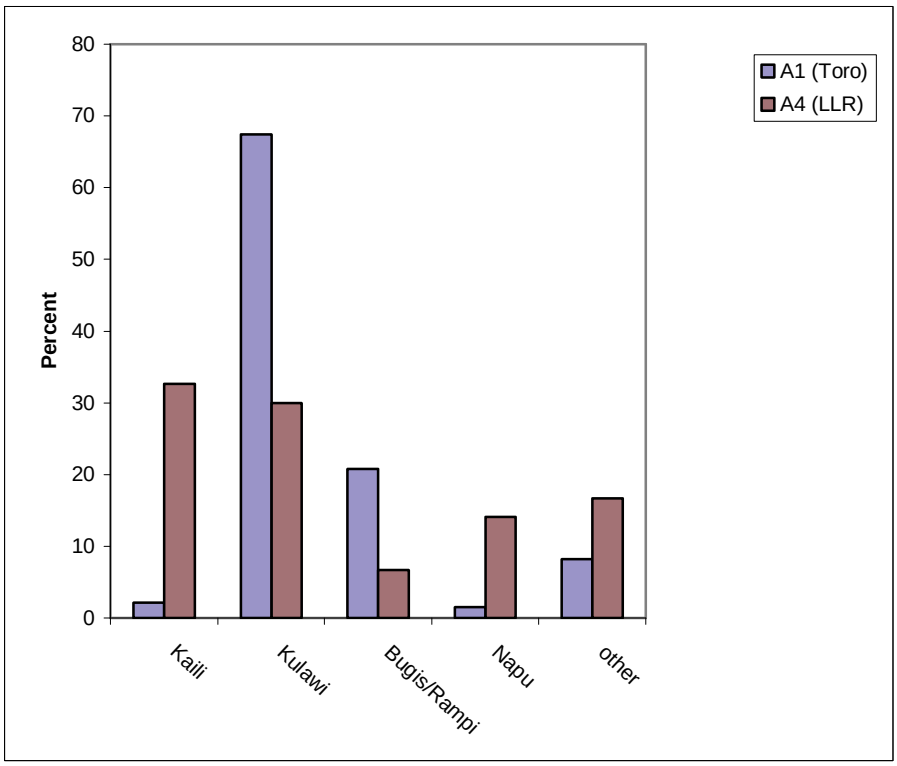


Figure 2: Level of schooling of the head of household



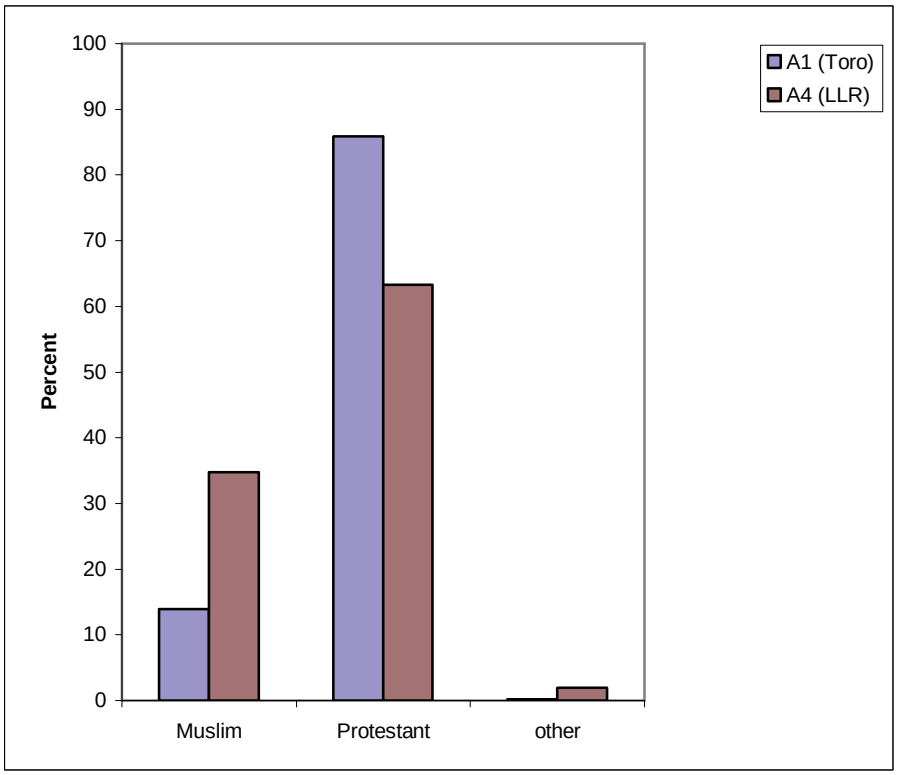
Source: Census of Project A1 (2004) and Project A4 household survey

Figure 3: Ethnicity of the head of the household



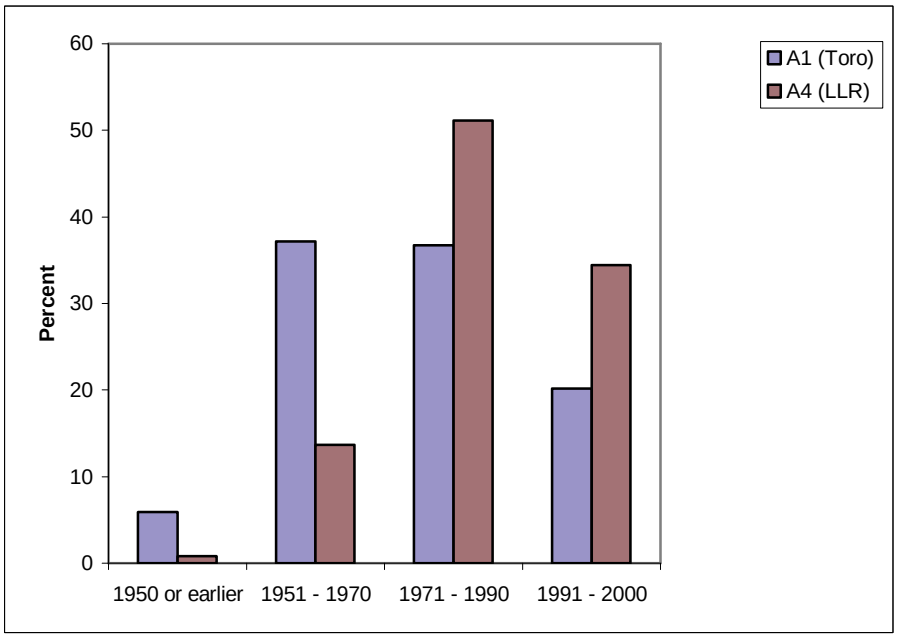
Source: Census of Project A1 (2004) and Project A4 household survey

Figure 4: Religion of the head of household



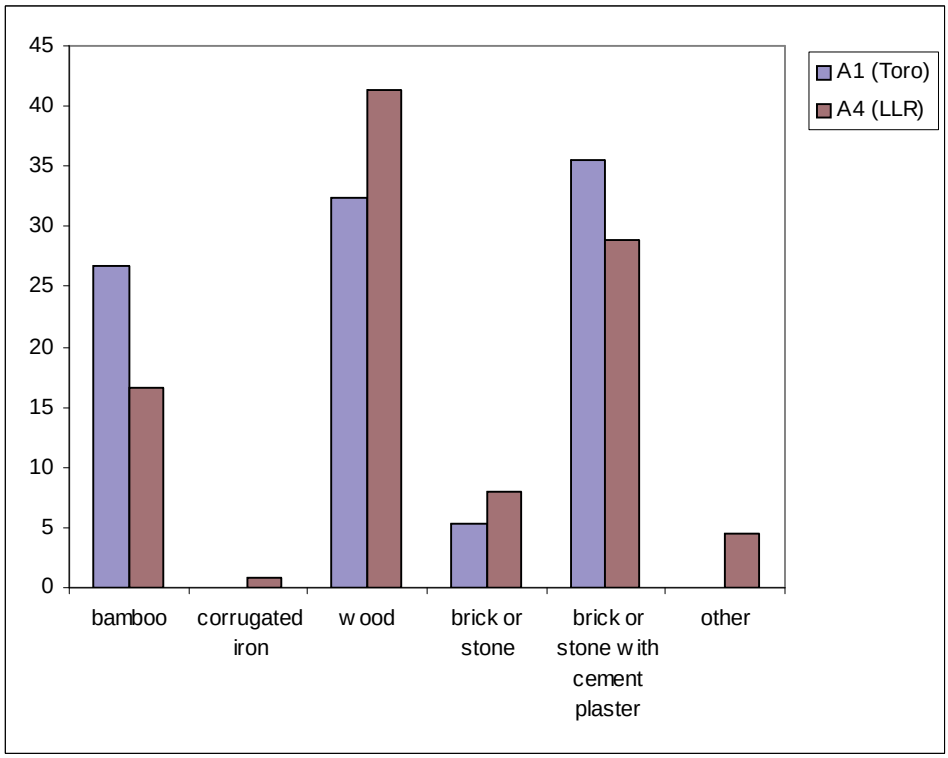
Source: Census of Project A1 (2004) and Project A4 household survey

Figure 5: Year of migration of the household head



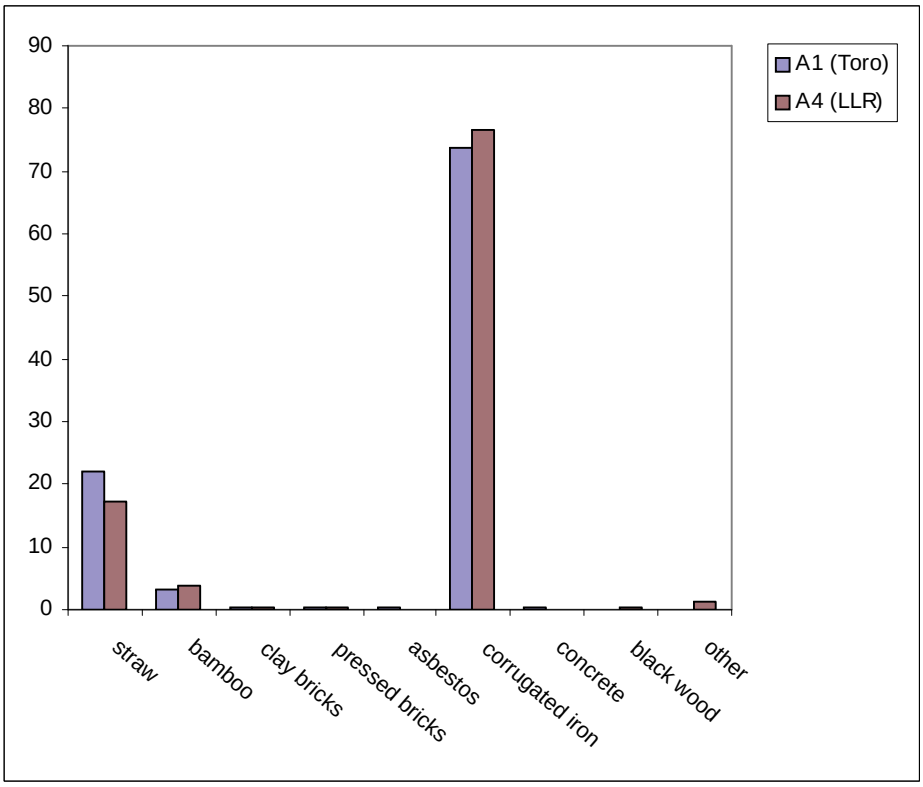
Source: Census of Project A1 (2004) and Project A4 household survey

Figure 6: Dwelling: Material of the exterior wall



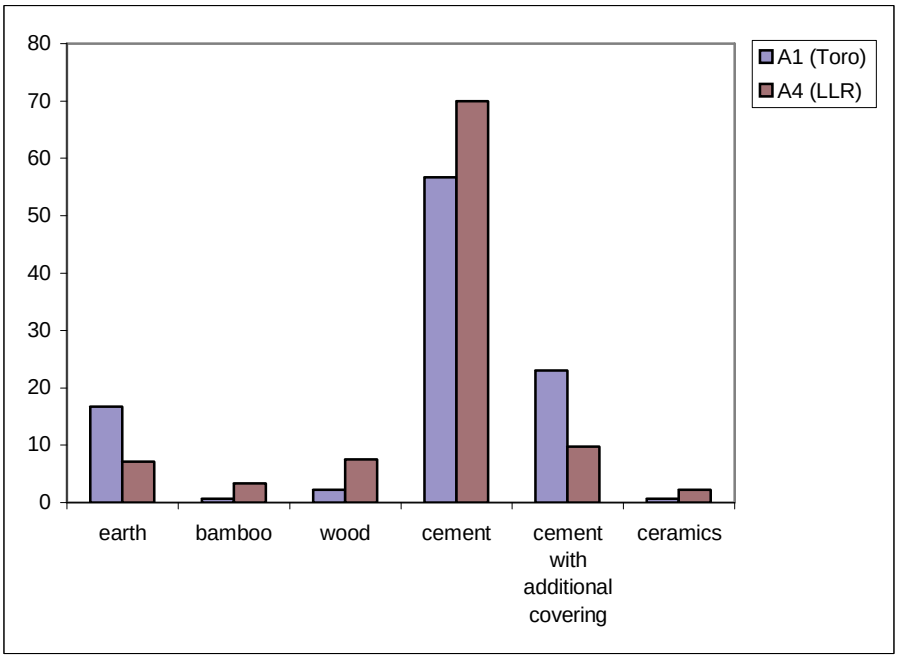
Source: Census of Project A1 (2004) and Project A4 household survey

Figure 7: Dwelling: Roofing material



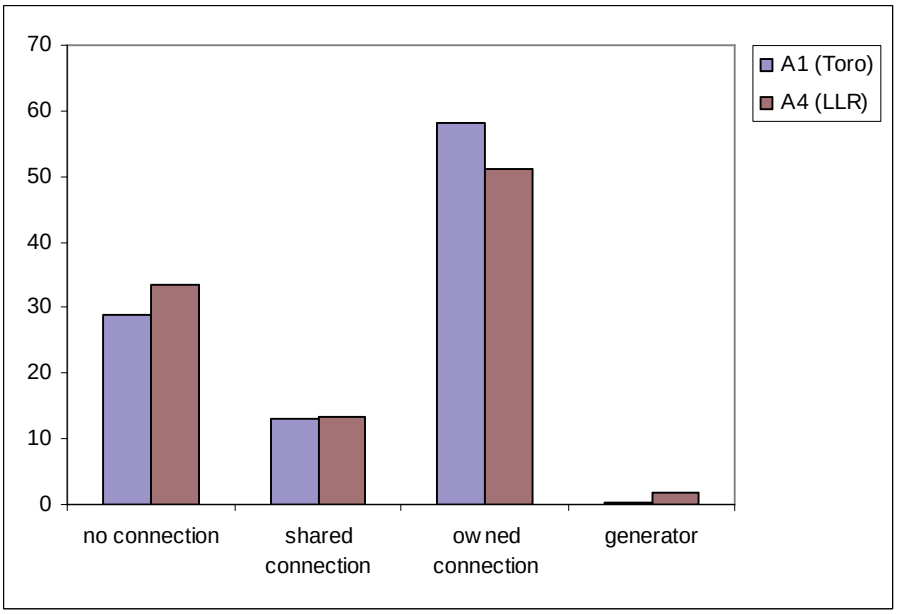
Source: Census of Project A1 (2004) and Project A4 household survey

Figure 8: Dwelling: Flooring material



Source: Census of Project A1 (2004) and Project A4 household survey

Figure 9: Dwelling: Electricity supply



Source: Census of Project A1 (2004) and Project A4 household survey