

**The Fish is the Friend of Matriliney:
Reef density predicts matrilineal inheritance across the world and its persistence in
Melanesia**

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Abstract:

Reef density predicts the prevalence of matriliney in a cross-cultural sample of 186 societies and in a sample of 59 small-scale horticultural fishing communities in the Solomon Islands. We show that this result holds even controlling for common descent by relying on variation within ethno-linguistic groups in our Melanesian micro-sample, where matriliney is ancestral. This paper thus establishes reef density and, indirectly, reliance on fishing, as a robust predictor of the persistence of matrilineal inheritance. Explanations based on the sexual division of labor and on inclusive fitness arguments support our results. We also document some of the demographic consequences of matrilineal inheritance, with smaller household and village population size.

Introduction

The majority of existing societies exhibit a large gender bias against female inheritance of land and other assets. In only 16% of the 186 societies studied in the Standard Cross Cultural Sample [1] land is transmitted through females (see Figure A1 in Supplementary Appendix). The extent of female land rights has been shown to affect overall productivity of labour [2], economic efficiency [2], and the effectiveness of land right reforms [3]. Female ownership of land also increases female bargaining power, which affects the outcome of intra-household bargaining, in particular fertility ([4, 5] [6]), sex-biased mortality [7], and public good provision [8]. Despite this significant literature on the consequences of matrilineal versus patrilineal inheritance, the question remains as to what determines the norm society adopts.

The rules of human social organisation, in general, and inheritance, in particular, have been described as the evolutionary outcome of a process of vertical descent, in which

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norms are inherited from parents and parents' societies, with adaptation to the ecological conditions ([9], [10], [11]). The current literature has identified three main determinants of the prevalence of patrilineal versus matrilineal inheritance. The first consists of the sexual division of labour [11]. For example, hunting is less compatible with the evolutionary commitment of women to childbearing because it is risky, requires long absence and is extremely skill intensive. Because women devote so much time during their reproductive life to childbearing, it is more difficult for them to accumulate the human capital and experience required to become an efficient hunter [11]. A similar argument could be made for fishing. Another example is plough agriculture, which requires significant upper body strength and puts a high premium on male labour. In this context, since men are primarily responsible for land cultivation, it is more efficient to transmit land to sons, making them residual claimant of their effort and investment [12].

The second determinant of patrilineal societies consists of the evolutionary benefit in terms of reproductive fitness of transmitting wealth to sons versus daughters. When a resource, such as land and cattle, enable a son to secure one or several wives, this encourages parents to transmit such resources to sons in order to maximise the number of offspring in the next generation. Finally, the risk of paternity uncertainty poses a potential cost to wealth transmission to sons, a cost against which the benefits of inclusive fitness must be balanced. The degree of paternity certainty is also influenced by ecological factors that determine, for example, how long males need to be away for the purposes of resource exploitation, trade, raiding, or warfare. A direct implication of these last two determinants is that family size will be larger in a patrilineal system, because the additional benefit in terms of the number of offspring that can be secured by transmitting an asset to sons needs to outweigh the loss in terms of paternal certainty [13].

Matrilineal inheritance has several robust ecological correlates. It is prevalent in horticultural societies, but it is rare in agricultural societies that rely on plough use and virtually absent in societies that have domesticated large animals [14], [13, 15], leading some to state that: “The cow is the enemy of matriliney” ([14] p. 680). Wherever large animals were domesticated along the Bantu expansion in Africa, matrilineal inheritance was systematically abandoned [13, 15]. Reliance on fishing has also been associated with matriliney, particularly in the context of North-West American matrilineal fishing groups [14]. However, the statistical significance of this correlation has not been established in the existing literature. Moreover, prior work does not identify whether this correlation is the result of adaptation to ecological conditions or whether it reflects the differential likelihood of groups with pre-existing norms, conducive to matriliney, to settle in fish-abundant environments.

We make three main contributions. First, we employ an exogenous measure of reliance on fishing, reef density, which varies little over time and is difficult to modify through fishing intensity by the small horticultural societies we study. That is, our measure does not reflect behaviour or adaptation by nearby human societies. Second, we establish the statistical significance of the association between reef density, our proxy for reliance on fishing, and matrilineal inheritance. Third, we identify that this correlation reflects adaptation rather than vertical descent. To do so, we show that the relationship between

reliance on fishing and hereditary rule is robust even within ethno-linguistic groups, for whom vertical descent is similar. We then document some of the demographic consequences of matrilineal versus patrilineal inheritance.

Data

This paper relies on the Standard Cross Cultural Sample (hereafter, SCCS) ([1]) and on original micro-level data collected by the authors among small horticultural fishing villages in the Solomon Islands. The SCCS data set contains information on 186 cultural societies of the world that was originally selected from a list of 1,267 Ethnographic Atlas societies. Among these societies, 16% are matrilineal (See Figure A1 in Appendix). In the Solomon Islands, we randomly selected a sample of 59 villages in 3 provinces (Choiseul, Malaita and Western Province).⁴ These villages are small, remote, coastal lowland villages, protected from the deep sea by coral reefs (See Figure A2 and the description of our sample in Section 2.3. to 2.5 of the Supplementary Appendix). On average, there are 488 people in a village, the vast majority of whom (82%) rely solely on subsistence fishing and horticulture, without plough agriculture or large domestic livestock. In our sample, fishing is exclusively a male activity and relies on traditional techniques, with men-operated paddleboats or outboard canoes. None of the fishermen in our study have access to modern fishing techniques nor use a motor to operate boats on fishing expeditions. Fishing is a risky activity, namely because of the risk of crashing on the reef on the way in or out of the village, particularly at night. Women are involved in the exploitation of some near shore sea resources, in particular the cultivation of sea grass. Both men and women participate in agricultural activities, but women are, on average, much more involved than men in agriculture.⁵

We selected the Solomon Islands as a study site for two main reasons. First, while Eurasia shows predominantly patrilocal residence and patrilineal inheritance, matrilineal descent and matrilocal kinship structures are common among Austronesian-speaking societies of the Pacific [16] and, importantly, inheritance is ancestral. The ancestral character of matrilineal descent and of matrilocal residence in Austronesia, ca 5,000-4,500 BP and in Melanesia since at least 3,450 BP has been well established in the literature, from linguistic, archaeological and genetic evidence [17] [18] [19]. Given the ancestral character of matriliney in our sample, our analysis concerns the transition away from matrilineal inheritance to patrilineal inheritance. Second, in this setting, we observe variation between inheritance rules within small geographic areas (see Figure A2 in Supplementary Appendix), and even within ethno-linguistic group (See Figure 2).

To identify a village's reliance on fishing we measure the density of coral reefs in a 10km-radius of a village, a reasonable limit for a regular fishing trip on a paddleboat or outboard canoe. The reef data is from the Global Distribution of Coral Reefs (2010) a

⁴ For more details on our sampling procedure, please see Section 2.3. in the Supplementary Appendix.

⁵ Farming is the main source of income for 26% of women, against 17% of men, difference in means p-value < 1%). See more details in Section 1.1 in the Supplementary Appendix.

dataset compiled from a number of sources by the UNEP-World Conservation Monitoring Centre and the World Fish Centre, in collaboration with the World Resources Institute and The Nature Conservancy [20]. Reef information and data quality is particularly good for the Solomon Islands but variable across the world, which explains why we use slightly different methods to examine reef data in the SCCS sample and in our Solomon Islands sample (see Section 2.1. in Supplementary Appendix).

The prominence of a reef or group of reefs has a large impact on the quality and importance of fishing. Coral reefs produce nitrogen and other important nutrients that are essential for marine organisms. These traits make reefs a vital food source for a number of different adult fish species who also use reefs to protect their spawn and juveniles. Coral reefs occupy less than 0.1% of the ocean's surface yet they are the habitat for over one-third of the world's marine fishes [21]. The UN estimates that over 1 billion people worldwide rely on fish that grow and live on coral reefs, while nearly all of the estimated 30 million small scale fishers in the developing world are dependent on reefs as their main source of fish ([22] and [23]).

Analysis in a cross section of 186 societies

The density of reefs as a proxy for reliance on fishing and, in turn, as a predictor of the prevalence of matrilineal versus patrilineal inheritance across the world, is confirmed in the SCCS dataset. Societies that are surrounded by more reefs within a 10-kilometre radius are more likely to rely on fishing as a source of livelihood (see Table A1 in Supplementary Appendix). An increase by one standard deviation in the density of the surrounding reef increases the likelihood of reliance on fishing by 0.34 standard deviations (difference in means p-value: 0.00). In turn, these societies are more likely to be matrilineal, and this relationship is also statistically significant. An increase by one square km of reef (a 26% increase at the mean) is associated with an increase in the probability of a society being matrilineal by 0.2% (a 0.01% increase at the mean) (difference in means p-value: 0.081). These results are included in Table A1 in the Supplementary Appendix and illustrated in Panel A of Figure 1, which shows a statistically significant difference in the density of reef surrounding matrilineal societies. Within a 10-kilometre radius of matrilineal villages, there are on average 10.80 square kilometres of reef compared to 2.49 in patrilineal villages.

The analysis with the SCCS dataset has several limitations. First, the SCCS sample is not a random sample of societies across the world. Second, as we have already noted, the quality of the reef data is variable across the world. Third, and more importantly, the societies in the SCCS dataset face different ecological conditions but also differ in the groups from which they descend. This makes it impossible to identify whether the correlation between reef density and matriliney is due to adaptation to ecological conditions or to vertical descent.

By contrast, in our Solomon Islands sample, we obtained a random sample of villages, reef data quality is high, and we observe variation in inheritance rules within ethno-linguistic group, which enables us to control for phylogenesis effects.

Analysis in the Solomon Islands

We follow the phylogenetic method and proxy descent by language group. Language is the main source of identification among the people of the Solomon Islands, a country where linguistic diversity is amongst the highest in the world. The country has an estimated 71 live languages still spoken today among a total population of half a million people, and 4 extinct languages [24]. We recorded 22 different languages spoken in our sample of 59 villages. The two largest languages, To'abaita and Varisi, are spoken in 7 different villages. Out of the 22 languages identified, 10 are spoken in only one of our survey villages. However, many of these are different dialects of the same language. We reconstruct the phylogeny of each language using *Ethnologue: Languages of the World* [25], a database of more than 7,000 languages that contains information on many different dialects and how they are related, as well as on the genetic classification of each language. We first group together different dialects that belong to the same language. Our data thus comprises 9 different languages, which are the final nodes of the tree in Figure 2.⁶ We then trace back each language to two distinct main language groups: Central Solomons and Austronesian. Languages of the Austronesian family consist of two main groups: Central Eastern Oceanic and Western Oceanic, which we consider as two separate groups in the analysis. This permits three different language groups in the analysis: Central Solomons, Central Eastern Oceanic, Western Oceanic.⁷ Figure 2 displays the resulting language tree.

20% of our sampled villages have a matrilineal land inheritance system, where land is transmitted by mothers to their daughters. Less than 4% display a mixed system in which both the father and the mother can transmit land. Mixed systems are taken in the literature as an indication of a transition from matrilineal to patrilineal inheritance ([26], [27], [17], [28] and Section 1 in Supplementary Appendix). Figure A2 in Supplementary Appendix plots the distribution of matrilineal and patrilineal inheritance across our survey sites. Matrilineal inheritance is most prominent in Western Province, where 50% of surveyed villages have matrilineal inheritance. Inheritance rules vary within province, and even within short geographic distances. Crucial for our identification strategy, we also observe variation in inheritance rules within language groups. This is illustrated in the final nodes of the language tree in Figure 3. For example, Touo and Bilua are both Central Solomons languages. Yet in a Touo village, land is transmitted through mothers, whereas it is transmitted through fathers in a Bilua village.

7% of our sampled villages report matrilocal post-residence rules, where the newly married couple resides in the bride's village, whereas 56% reporting patrilocal post-residence rules. Post-marital residence is considerably more mixed than inheritance, with 36% of villages displaying a mixed system. The highest prevalence of matrilocality is

⁶ Recorded language is missing in one village of our study and we were unable to find any reference in Ethnologue for only one language in our study: Mbaere that is the spoken language in Tiqe village in Western Province. We thus have valid observations in 57 villages.

⁷ Our analysis is robust to grouping the two Austronesian languages together. See Table A5 in Supplementary Appendix.

again found in Western Province, where a quarter of the villages are matrilocal. Although matrilineality and matrilocality are strongly correlated (correlation coefficient of 0.37, significant at the 1% level), the overlap is not perfect. However, as can be expected, villages with matrilineal inheritance are much less likely (by 32 percentage points, difference in means p-value: 0.056, see Table A3) to display patrilocal post-marital residence rules.

Matrilineal villages are smaller (mean of 292.5) than are patrilineal villages (mean of 533.2) in patrilineal villages (difference in means p-value: 0.037, see Table A3). The share of households relying solely on subsistence is higher in matrilineal villages, and these villages are more remote, although the relationship is not statistically significant. This pattern is again consistent with a general switch to patrilineal inheritance in less remote and more developed areas. However, wealth and food security are higher in matrilineal villages. The proportion of people with roof iron, one of the main proxy for wealth, is 47% in matrilineal villages against 40% in patrilineal village (difference in means p-value: 0.15, see Table A3). The proportion of people declaring they always have enough food for all family members is also 6 percentage points higher in matrilineal villages (difference in means p-value: 0.049, see Table A3). The main prevailing religion in the village displays some statistical difference between matrilineal and patrilineal villages, with patrilineal villages more likely to have adopted Western religions, such as Anglicanism and Catholicism. We control for these statistically significant differences in the empirical analysis.

To test the hypothesis that a larger reef density reduces the likelihood of transition away from matrilineal inheritance, we regress the presence of matrilineal inheritance on our measure of reef density, the number of shallow reefs in a 10 km radius.⁸ Regression results reporting the marginal effects of the independent variables are displayed in Columns 1 to 3 of Table 1.

In the first column, we present the raw correlation between matriliney and reef density, without including any control variables. The relationship is statistically significant at the 1% level. The magnitude of the results is non-negligible. One more shallow reef in a 10 km radius (a 2.4% increase at the mean) is associated with an increase in the probability of matriliney in a nearby village by 4.76% (a 2.5% increase at the mean). On average, matrilineal villages have twice the density of reef in a 10-km radius compared to patrilineal villages (see also Table A2 in Supplementary Appendix). This may explain the reported fact above that wealth and food security are higher in matrilineal villages. The goodness of fit of the regression in Table 3 is very satisfactory. The pseudo R² statistics

⁸ Our analysis is robust to taking the log transformation of the number of shallow reefs in a 10km radius. See Table A5 in Supplementary Appendix. Because of the discrete nature of the dependent variable, we check that the results are robust to using a nonlinear logit regression estimation model. However, for ease of interpretation, we discuss the results of an OLS regression model. We have checked that an OLS model did not predict values outside the 0-1 range for the dependent variable.

indicates that our reef density measure explains 20% of the variation in the presence of matrilineal inheritance across villages.

Because descent plays a central role in the distribution of social norms, it is important to study the influence of ecological variation for constant descent. We do so in Column 2 by accounting for phylogenesis and including controls for language fixed effects. The results are robust, with reef density predicting the presence of matriliney to a similar extent and with similar confidence (p-value < 1%). Adding language fixed effects increases the goodness of fit; reef density and phylogenesis together explain 37% of the variation in the presence of matrilineal inheritance across villages. These results indicate that although language groups explain much of the variation in matrilineal inheritance, reef density accounts for a considerable amount of the within-group variation.

In Column 3, we check that our results are robust to controlling for differences between patrilineal and matrilineal villages in terms of subsistence patterns, of religion and political structure. We do so in order to control for the influence of possible confounding factors across patrilineal and matrilineal villages. The results are robust to adding this battery of controls. It is also worth noting that the coefficient associated with our main independent variable, reef density, is very stable across specifications. Since we include a large number of potential confounders, the stability of our point estimate suggests that the presence of other potential confounders is not a significant concern for the validity of our results.^{9 10}

Our results indicate that where the surrounding reef is of higher density, matrilineal inheritance has remained the predominant rule of inheritance of land. The importance of coral reefs for fishing has several consequences for land assets. First, given that

⁹ According to a recent statistical test developed in 29. Oster, E., *Unobservable Selection and Coefficient Stability: Theory and Evidence*, in NBER working paper. 2013, NBER., based on the recommended assumption that the maximum R-squared is 1.3 times the R-squared obtained with the full set of controls, the influence of unobservable variables would need to be more than 22 times as large as the influence of all controls included in Column (3) to explain away the influence of reef density as a predictor of the persistence of matriliney. With the assumption of a maximum possible R-squared of 1, a highly conservative scenario, the corresponding number is still more than 7. When language groups fixed effects are included in the baseline regression (as in Column (2)), adding controls in Column (3) results in an increase in the magnitude of the coefficients, which suggests that adding more unobservable variables to the regression may move the coefficient on reef density even further away from the null of no effect.

¹⁰ We re-estimate the model clustering by language group. Since we have 3 clusters we use the Wild cluster bootstrap method altering the distribution of weights in the bootstrap to a six-point distribution as proposed by [40]. This method is shown to outperform the standard wild bootstrap for estimations with less than 10 clusters [40]. Using this method, we find almost identical standard errors as the standard model. P-values are reported in Table A4 in the Supplementary Appendix

evolutionary factors increase the likelihood of male concentration in fishing, the sexual division of labour across fishing and farming may be sharper where reef density is high. In these circumstances, making daughters residual claimants of land improves their effort and investment incentives. Second, where reef density is higher, land is relatively less important as an asset, so that its transmission to sons is not expected to contribute greatly to improving their relative fitness over daughters, especially considering the sexual division argument just made. Last, fishing is risky and necessitates prolonged male absence. This explains the specialisation of men in fishing, but also justifies a more matricentric societal organisation. One could expect paternity certainty to be lower in villages more orientated towards fishing, although we are unable to test for this hypothesis in our current framework.

Finally, we investigate some of the socio-demographic consequences of inheritance rules. We test for the prediction that family size will be higher in a patrilineal system compared to a matrilineal system [13]. This hypothesis is related to the explanations for inheritance rule that rely on the maximisation of inclusive fitness. The economic literature has also stressed that land ownership improves the bargaining power of females, which in turn reduces fertility ([6], see [31] for a review). Moreover, because proximity to reefs may be associated with greater female responsibility for farming, the opportunity cost of foregone agricultural production due to childbearing may also induce smaller family sizes.

To test this hypothesis, we regress population size on the presence of matrilineal inheritance in Columns (4) to (9) of Table 3. We examine both the effect on total population size at the village level and on household size. As before, we first present the simple correlation between reef density and village size (Column 4) and household size (Column 7). We then control for language fixed effects (Columns 5 and 8) as well as for the set of controls for subsistence patterns, political organisation and religion (Columns 6 and 9).¹¹

We find a negative, statistically significant, and sizeable effect of matrilineal inheritance on population and household size. According to our estimates, switching from matrilineal to patrilineal inheritance would be associated with an increase in village and household size by around 50%.

Conclusion

Our results establish that ecological conditions play a central role in the evolution of inheritance rules, a central norm of social organisation that has large implications for welfare [32], economic efficiency and economic growth [33] [34]). The main contribution of our study is to establish the direct effect of adaption to ecological conditions as a predictor of inheritance rules. However, we do not argue that descent is irreverent, in fact we provide evidence that both ecological factors and phylogenesis are

¹¹ We also re estimate Columns 5-6 and 8-9 using the wild cluster bootstrap method with a six-point distribution [40]. Using this method, we find similar results for household size, but the results fall short of statistical significance for the total number of households in the village. P-values are reported in Table A4 in the Supplementary Appendix.

important determinants, which together explain nearly 40% of the variation in the prevalence of matrilineal versus patrilineal inheritance across our sampled villages in the Solomon Islands.

Our findings contribute to a recent literature on the enduring effects of geographic endowments on relative outcomes of females and males, namely on the sex ratio ([7], [35]), fertility, female labour force participation and female representation in politics [4] [12]. Our findings that reef density systematically predicts the prevalence of matrilineal inheritance and that, in turn, matrilineal inheritance is associated with smaller population has important implications for welfare and economic development. Because of their influence on genetic diversity [17] and on fertility and population density, inheritance rules have important consequences for economic growth [36, 37], innovation adoption and economic development [38] [39], as well as conflict [39].

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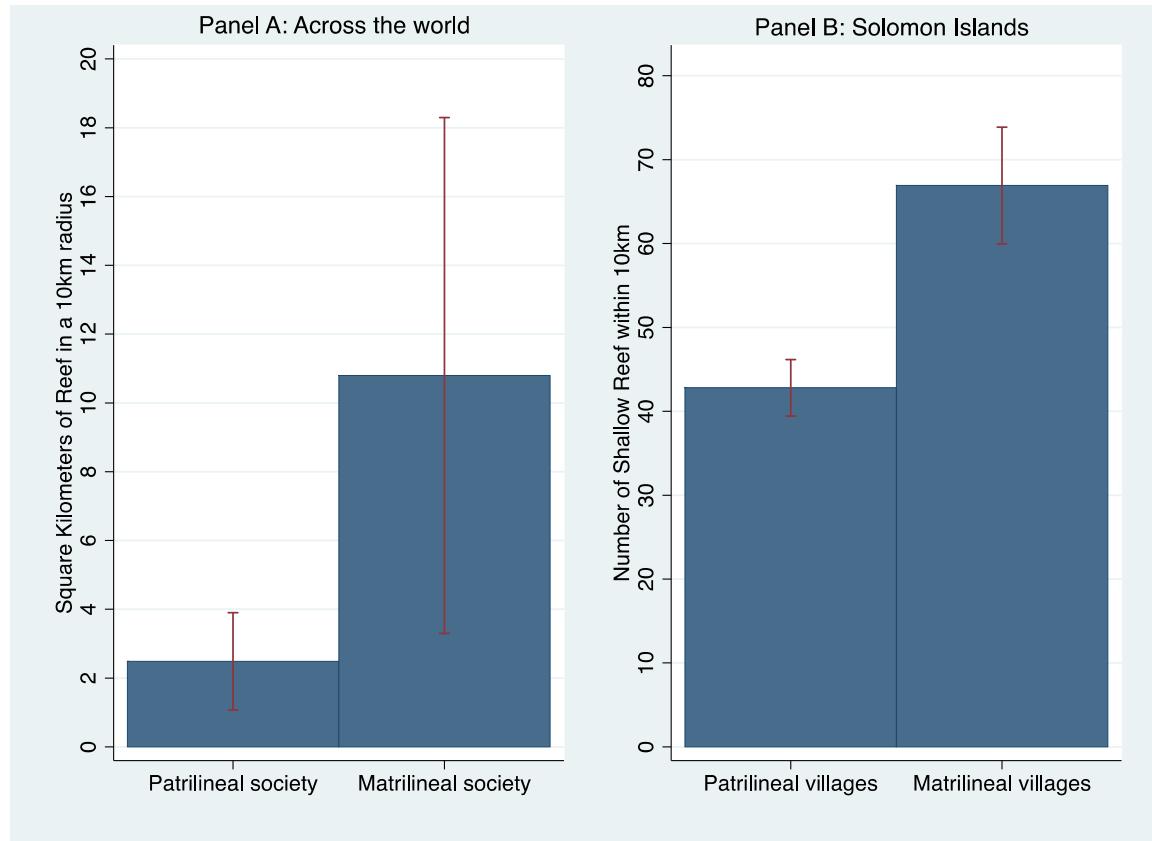
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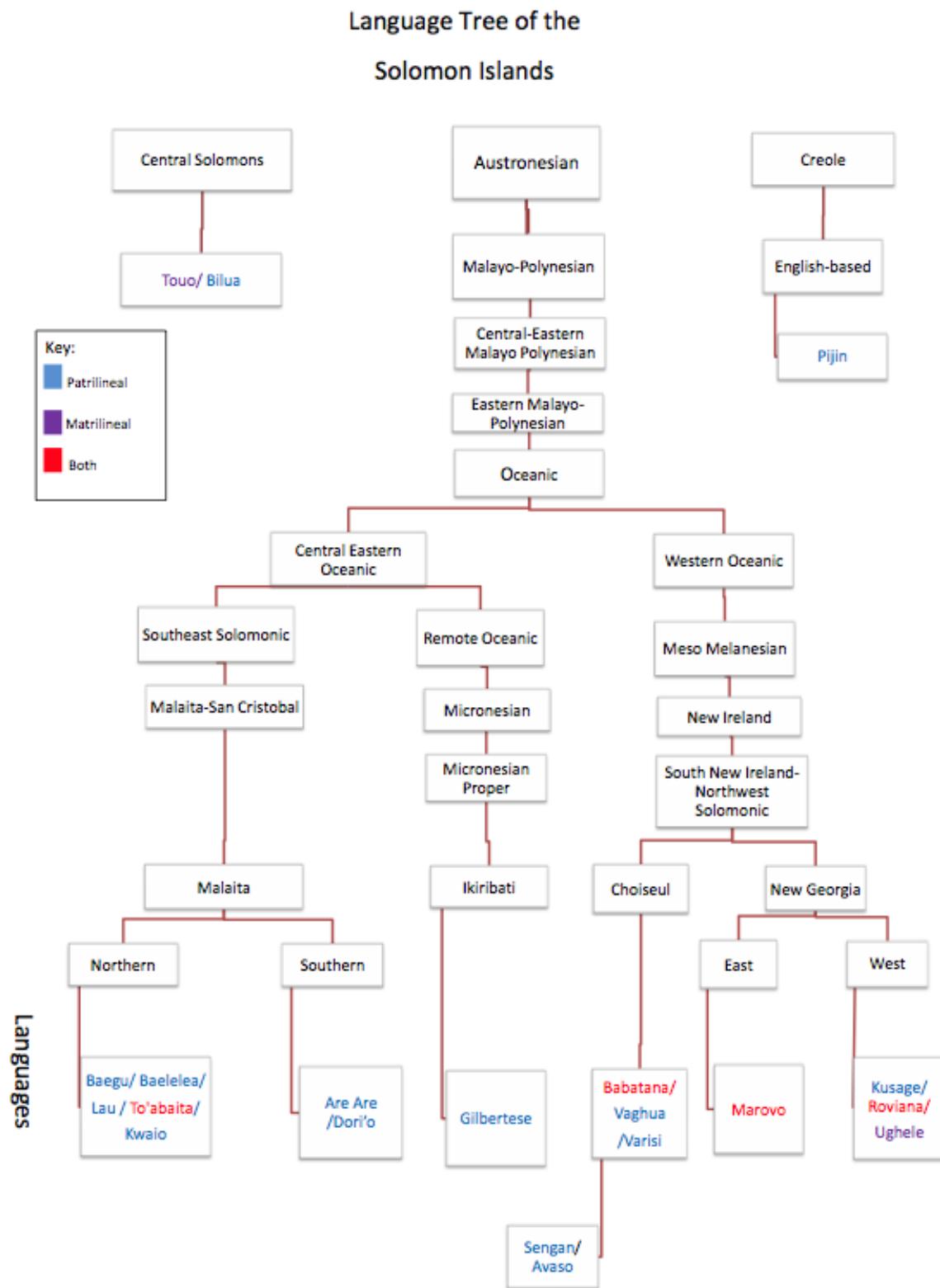
TABLES AND FIGURES

Figure 1: Correlation between matriliney and reef density across the world (Panel A) and in our sample of the Solomon Islands (Panel B)



Source: [1], *World Atlas of Coral Reefs, Authors' data*

Figure 2: Language tree of the Solomon Islands and of our sample languages



Source: Ethnologue [24]

TABLES

Table 1: The ecological determinants of matrilineal inheritance and its demographic consequences

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Matrilineal inheritance			Total Number of People in Village			Household size		
Number of shallowreefs in 10km radius	0.006*** (0.002)	0.005*** (0.002)	0.006** (0.003)						
Matrilineal inheritance				-240.691** (112.540)	381.036** (185.099)	-352.334+ (218.509)	-4.525+ (2.776)	-5.720+ (3.444)	-10.046* (5.453)
Constant	-0.053 (0.051)	0.419+ (0.270)	0.009 (0.348)	533.191*** (93.470)	935.777** (413.399)	843.035** (345.571)	11.087*** (2.147)	9.897*** (3.057)	9.688 (7.561)
Religion and political controls	no	no	yes	no	no	yes	no	no	yes
Language group fixed effects	no	yes	yes	no	yes	yes	no	yes	yes
Observations	58	56	52	57	56	52	57	56	52
R-squared	0.196	0.337	0.526	0.025	0.055	0.289	0.016	0.068	0.143

Notes: The unit of observation is a village. Coefficient estimates from OLS regression. Robust standard errors corrected for heteroskedasticity are reported in parenthesis. ***, **, * and + indicate statistical significance at the 1%, 5% and 10%, 15% level, respectively. For full results for the full set of included controls see Table A4 in Supplementary Appendix.

Sources: Authors' data and [20].

Online Supplementary Appendix for:

**The Fish is the Friend of Matriliney:
Reef density predicts matrilineal inheritance across the world and its persistence
in Melanesia**

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24 December 2014

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1. Background: Resources and Inheritance Rules

In this section, we provide some background on the relationship between ecological resources and human social organisation. We focus on fishing and horticulture as predictors of matrilineal inheritance. We then review how this literature, as well as linguistic and genetic evidence, all point to the ancestral character of a matricentric orientation in the Solomon Islands.

1.1. Resources and Inheritance Rules

Human social organisation is an evolved process that is subject to the forces of natural selection (see among others (Boyd 2005) (Jordan, Gray et al. 2009)). In particular, human social organisation has been shaped in a co-evolution process with ecological factors (Kaplan, Hooper et al. 2009).

In the paper, we focus on the allocation of private property and the transmission of wealth, which are specific features of human social organisation and, as such, are expected to co-evolve with evolutionary and ecological forces.

We focus on a specific form of matrilineal inheritance, in which land is inherited by daughters. This form of matrilineal land inheritance is the norm in our sample, as well as in other societies in south central Africa, including large parts of Malawi, Zambia, and Mozambique and in some native American cultures including the Arikira, Hidatsa, Mandan, and Zuni (Murdock 1967). In other matrilineal cultures, land is transferred from the mother's brother to his sister's son. As noted by (Holden, Sear et al. 2003), despite their apparent differences, these two forms of matrilineal inheritance are equivalent for grandparents and both result in inheritance by their daughters' offspring.

The literature has discussed several robust empirical correlates of the prevalence of matriliney. Matriliney is prevalent in horticultural societies, but it is rare in agricultural societies that rely on plough use ((Boserup 1970)) and virtually absent in societies that have domesticated large animals ((Aberle 1961), Mace and Holden 1999, (Holden, Sear et al. 2003, Mace and Holden 2005)). As (Aberle 1961) puts it: “The cow is the enemy of matriliney” (p. 680). (Mace and Holden 2005) confirm that matriliney was abandoned along with cattle adoption among Bantu-speaking societies of Africa. Although receiving much less attention in the literature, reliance on fishing and matriliney has been observed in the literature in the context of North-West American matrilineal fishing groups ((Aberle 1961)). This correlation was confirmed to be statistically significant in our analysis in the Murdock sample discussed in the introduction. However, no prior work has examined whether this correlation is robust to controlling for phylogenetic effects.

The first explanation for these correlations relates to the sexual division of labour. (Kaplan, Hooper et al. 2009) argue that many features of human social organisation are the result of sex-specific economic specialisation, which responds to evolutionary and ecological imperatives. The authors focus on the family structure and pair-bonding in particular, which is the result of male specialisation in hunting. Hunting is incompatible with the evolutionary commitment of women to childbearing because it is risky, requires long absence and is extremely skill intensive. Because reproduction

required a woman to devote time to childbearing, she was less likely to accumulate the human capital and experience required to become an efficient hunter. Although not directly discussed in (Kaplan, Hooper et al. 2009), fishing shares these characteristics with hunting. As a result, fishing in many societies is primarily a male activity. In the Murdock SCCS dataset, women are in charge of fishing in 5% of societies. In the Solomon Island sample, fishing is exclusively a male activity, although women are involved in some harvest activity from the sea, in particular the harvesting of sea grass.

Where societies pursue both horticultural and fishing activities, the sexual division of labour is one in which males fish and females farm. In our sample, only approximately 20% of respondents derive an income from selling products, but males are 10 percentage points, or 50%, more likely to earn an income from the sea compared to females, on average; and conversely, females are 10 percentage points more likely to earn an income from farming compared to men.¹

The transmission of wealth via patrilineal or matrilineal systems depends on economic incentives for production and on evolutionary forces. Economic incentives suggest that, when transmitting wealth in the form of a productive asset (e.g., land), it is more efficient to bequeath this asset to those individuals responsible for production using that asset, who thus become the residual claimant of their effort and investment. In the context of plough agriculture, for example, where men are primarily responsible for agriculture because of the significant upper body strength required (Boserup 1970), (Botticini and Siow 2003), it is more efficient to transmit land to sons. Similarly, where male labour is devoted to fishing, the incentive to transmit land to sons is reduced, since their effort and investments are directed differentially toward other resources.

The prevalence of patrilineal versus matrilineal inheritance will also depend on the relative evolutionary benefit of wealth transmission to sons versus daughters. This evolutionary benefit is shaped by two main forces, which play in opposite directions: (i) how much extra wealth improves male's reproductive fitness relative to female's, and (ii) paternity uncertainty. Wealth often has a larger effect on male reproductive fitness than on female reproductive fitness, which plays in favour of transmission to sons (Trivers and Willard 1973). For example, cattle can easily be stored and enhances marriage prospects of sons, even enabling them to take multiple wives in some societies. In these conditions, cattle transmission to sons improves the reproductive success of sons more than that of daughters. However, the advantage of wealth transmission to sons in terms of inclusive fitness must be balanced with the potential cost due to the risk of paternity uncertainty. By contrast with relative fitness arguments, paternity uncertainty always favours transmission of wealth to daughters, and matrilineal societies tend to have lower levels of paternity certainty. The degree of paternity certainty is influenced by ecological factors that determine how long males need to be away for the purposes of resource exploitation, trade, raiding, or warfare.

(Holden, Sear et al. 2003) develop a simple theoretical model, which combines the two evolutionary forces described above. When deciding to transmit an asset, for

¹ These effects are statistically significant at the 1% level.

example land, to either son or daughter, parents maximise their inclusive fitness. It can easily be derived that transmission to sons will dominate transmission to daughters if the additional benefit in terms of number of offspring that can be secured by transmitting an asset to sons outweighs the loss in terms of paternity certainty of transmitting wealth to sons. An important prediction of this model is that the number of offspring should be much larger in a patrilineal society than in a matrilineal society. This model can be augmented to include considerations that relate to the sexual division of labour. Specialisation of males in agriculture, for example, would increase the benefit of transmitting land to sons in order to preserve their incentives to provide effort and invest in land (Botticini and Siow 2003).

It is clear from this discussion that reliance on fishing in a horticultural society is a favourable condition for matrilineal inheritance of wealth. Men have an advantage for fishing, as they have in hunting (Kaplan, Hooper et al. 2009). In these conditions, females are more likely to inherit land than in contexts where fishing is less prevalent. Where fishing is abundant, land is a relatively less important resource, and its transmission to sons may not improve sons' relative fitness enough to outweigh the potential negative effects on daughters' incentives. Fishing is also risky, which reduces the incentives to rely on the paternal line, since one has only one father but may have several uncles; and it entails male absence from the village, which increases paternity uncertainty, although we are not able to test this hypothesis directly. Several authors before us have noted that fishing and trade in the Pacific require prolonged male absence and favour the prevalence of matrilocality and matrilineal descent (Hage and Marck 2003). Historical and archeological evidence in eastern North America document switches to matrilocal residence following changes in subsistence practices and prolonged male absence for trading, hunting and raiding.

Matrilineal systems are less stable than patrilineal systems. (Levi-Strauss 1984) observes the tendency of matrilineal institutions to disappear in Micronesia, while (Hage and Marck 2002), in reference to both Micronesia and Polynesia, argue that wherever long distance voyaging declined or never developed, matrilineal descent gave way to patrilineal descent or mixed descent systems. Mixed systems of double descent are generally interpreted as transitory states between matrilineal and patrilineal institutions (Hage and Marck 2003). Linguistic evidence from communities in Malaita, one of the islands included in our study, reveals shifts from matrilineal to patrilineal descent, but not the converse (Blust 1996). Again, the explanations for the breakdown of matriliney and the transition to patriliney evolve around the types of arguments discussed above: economic specialisation, relative fitness, and paternity certainty. For example, when the degree of paternity certainty is not high, men might be tempted to distribute resources to their own children rather than to their nieces and nephews, which entails a breakdown of matrilineal systems. However (Blust 1986-1987) explains the transition to patriliney with an economic specialisation argument. Noting that there were no known patrilineal neighbours to Malaita to set the cultural example, he argues that the transition may have occurred as a result of male dominance in subsistence activities with a higher reliance on taro, a labour intensive crop, in Malaita and Choiseul, as opposed to other areas of the Solomon Islands (see also (Goodenough 1955)). However, the authors add that "the ecological contrasts (between taro and yam) seem slight. We are left groping for an explanation". We rely in this paper on much larger ecological differences.

1.2. Matriliney is ancestral in the Solomon Islands

Explaining the variation of matrilineal versus patrilineal descent raises the question of which came first. The advantage of Melanesia as a study site is that the ancestral character of matrilineal descent and of matrilocal residence have been well established in the literature.

Linguists and archaeologists have reconstructed ancestral settlement patterns based on phylogenetic analysis of languages and on genetic variations. There is a general agreement that Austronesian languages originated in Southeast Asia on or near Taiwan around 3000 BC and that Austronesian-speakers dispersed through long distance sea voyage by outrigger canoe, first reaching Melanesia by 1450 BC and then Western Polynesia by 950 BC (Hage and Marck 2003). They were agriculturalists, who possessed rice and probably more than one variety of millet and had domesticated animals, at least pigs and dogs (Blust 1996). Parts of Melanesia, around the Bismarck archipelago but probably not the Solomon Islands, had already been settled by non-Austronesian groups long before then, at least since 11,000 BC (Hage and Marck 2003).

Based on genetic evidence that Polynesian mitochondrial DNA (mtDNA) is of Asian origin while Polynesian Y chromosomes are of Melanesian (non-Austronesian) origin, (Hage and Marck 2003) conclude that matrilocality and matrilineal descent characterised ancestral Oceanic society. Indeed, this model is consistent with a matri-biased model in which non-Austronesian men married in groups organised by matrilineal descent along the way of the Austronesian expansion. This also argues in favour of the hypothesis that even though Melanesia, as opposed to more remote parts of Polyneisa, was already settled by the time of the Austronesian expansion into Oceania, (Hage and Marck 2003) intermixing between Austronesian- and proto-Austroneisan-speaking populations took place within the framework of matrilocal residence and matrilineal descent.

In an article aptly entitled “Matrilocal residence is ancestral in Austronesian societies”, (Jordan, Gray et al. 2009) argue that matrilocality was predominant in early Austronesian societies, ca 5000-4500 BP. This conclusion is reached using a cultural phylogenetic approach, which consists of using statistical simulation methods (Bayesian MCMC) based on present day ethnographic data (from (Murdock 1967)) to reconstruct the ancestral states of social organisation.

2. Data Sources and Methodology

2.1. SCCS

We utilise the Standard Cross Cultural Sample (SCCS) to examine a sample of worldwide matrilineal and patrilineal societies (Murdock and White, 1969). The SCCS data set contains information on 186 cultural societies of the world that was originally selected from a list of 1,267 Ethnographic Atlas societies. The goal of the SCCS is to represent the cultural diversity of well-described human societies—which range from contemporary hunter-gatherers to now extinct civilisations such as Rome 110 CE. These societies are considered largely independent of one another and

arguably representative of mutually distinct cultures (White and Murdock 2006). The data set contains close to 1,400 variables that capture various ethnographic and cultural elements.

Other large cross-cultural surveys that contain historical information on global matrilineal villages are rare and of questionable quality. Because the number of societies in the SCCS is large and heterogeneous enough to provide significant statistical analysis, it has become one of the most widely used data sets to study cross cultural societies. However, the dataset has several limitations for the purpose of our analysis. First of all, the societies included in the dataset differ widely in terms of their ecological environment as well as their origins and vertical descent. This means it is difficult to isolate the influence of the environment from other factors. Second, sampling of SCCS societies is not random so that generalisations from this dataset can be difficult. Lastly, our main measure or reliance on fishing consists of the reef density in the surroundings of different societies or villages. In the world sample, it is problematic to use the same reference system to calculate distances from points at different worldwide locations, due to the unique shape of the Earth. To overcome this it is common to use various local geocentric datum systems. To test if different systems affect our results we re-estimate our base models with different local geodetic systems; results are comparable (results available upon request).

To determine matrilineal inheritance, we use question v836 from Murdock et al (1969) on the primary rule of decent in each society. Approximately 16% of all societies in the sample are of matrilineal inheritance. The second variable used in our analysis Dependence on fishing is taken from SCCS question v205. The majority of societies (60%) depend on fishing for less than 15% of their diet.

2.2. Setting of the study in the Solomon Islands

Our study in the Solomon Islands took place in June - August 2013 in a sample of 79 randomly selected villages in each of four provinces in the Solomon Islands (Choiseul, Malaita, Temotu, and Western), with 20 villages sampled in each province (because of difficulty of access to one particular village, data was collected only in 19 in Western Province). Sampled villages were drawn from the population of villages receiving funds under the Solomon Islands Rural Development Program (henceforth RDP). RDP is a US\$22 million Community Driven Development Program initiative implemented by the Solomon Islands' Ministry of Development and Planning and Aid Coordination (MDPAC), and supported by AusAID, IFAD, and the World Bank.

We collected data from three different surveys in each village: an individual, household, and community leader survey. More detail on the individual and household survey is given in (Beath et al. 2014). The data used in this paper is taken exclusively from the community leader's survey, which included a battery of questions about village characteristics. Several village leaders, typically the village chief, a female representative and members of RDP's sub-project implementation committees were present. The community leader's survey is the main source of information on overall village characteristics, such as inheritance and post-marital residence rules, total population, religion, and political structure.

We exclude the province of Temotu from the analysis because there is no variation within this province in matrilineal or patrilineal inheritance rules, and because we are unable to reconstruct the phylogenesis of some of the languages spoken in this province from the Ethnologue. We are thus left with a sample of 59 villages in 3 provinces. We have checked that all the results reported in the paper are robust to using the full sample of 79 villages.

All the villages included in the study are remote, coastal lowland villages (see Figure A2). The average travel time between villages and their respective provincial capital is 8 hours and the average travel time to the country's capital city Honiara is two and a half days. The main mode of transport is by ship or outboard canoe; access to roads is very limited.

As is the case in most villages in the Solomon Islands, the villages we surveyed are small. Individuals within the village are organised first in households and second in tribal groups. We recorded the total numbers of households and tribal groups in each village. On average, each village in the survey counts 488 people, organised in 82 households and slightly over 4 tribal groups. All descriptive statistics are included in Table A2.

2.3. Social organisation in our sampled villages

The community leader survey asked several questions about the social and political organization of the village. In particular, we inquired about land inheritance and post-marital residence rules, as well as on the practice of dowry or bride price payments and customs dividing the distribution of marriage costs between the bride's and groom's family.

20% of our survey villages have a matrilineal land inheritance system, where land is transmitted by mothers only. Less than 4% display a mixed system in which both the father and the mother can transmit land. Mixed systems are indicative of a transition from matrilineal to patrilineal inheritance. Figure 2 plots the distribution of matrilineal and patrilineal inheritance across our survey sites. Matrilineal inheritance is most prominent in Western Province, where it is prevalent in 50% of surveyed villages. Inheritance rules vary within province, and even within short geographic distances. Crucial for our identification strategy, we also observe variation in inheritance rules within language groups. This is illustrated in the final nodes of the language tree in Figure 3. For example, Touo and Bilua are both Central Solomons languages. Yet, in our Touo village, land is transmitted through mothers whereas it is transmitted through fathers in our Bilua village.

7% of our survey sites report matrilocal post-residence rules, where the newly married couple goes and live in the bride's village, against 56% reporting patrilocal post-residence rules. Post-marital residence is a lot more mixed than inheritance, with 36% of villages displaying a mixed system. The highest prevalence of matrilocality is again found in Western Province, where a quarter of the villages are matrilocal. Although matrilineality and matrilocality are strongly correlated (correlation coefficient of 0.37, significant at the 1% level), the overlap is not perfect. Only 20%

of matrilineal villages are also purely matrilocal, and 50% are mixed, where post residence rules vary, with the remaining being patrilocal.

Marriage payments are generally more variable than inheritance rules and even post-marital residence rules. In only 2% of our villages, in Malaita Province, is there a pure dowry payment. Bride prices are much more predominant, in nearly 60% of villages. In the rest of the sample, mixed systems prevail, where both the groom and bride's families pay. Similarly, in less than 2% of villages the bride's family pay for the wedding costs, whereas the bride's family pays in 35% of villages, and the rest is mixed. The large prevalence of mixed systems when it comes to bride payments or wedding costs is consistent with anecdotal evidence of the rise of "love" marriages and the decreasing proportion of marriages taking place purely within traditional marriage patterns.

In the paper, we focus on inheritance rules, for two main reasons. First of all, inheritance provides the main economic motivation in this paper. Second, inheritance rules exhibit fewer mixed conditions than post-marital residence rules or marriage payments, which can be taken as an indication that they have been less affected by social changes in recent years and thus provide a more direct proxy for villages' traditional social organisation. There is, indeed, a much lower proportion of mixed, transitional systems in inheritance rules (only 4%) compared with any other dimension of social organisation previously mentioned. In our analysis of the Solomon Islands, we thus focus on the contrast between pure matrilineal and pure patrilineal inheritance.

Most of the villages (85%) are governed by traditional village chiefs. In some cases, elected leaders (8%) or church leaders (13%) play a role in village governance (there are many cases of multiple leader types within a given village). All villages have one or more churches, which also serve as the community hall for meetings. Religion is an important part of daily life, with at least one church service a day in most villages and all survey respondents claiming a religious affiliation. Although all are Christian, religious affiliations are very diverse in the Solomon Islands, as in most of the Pacific. In our sample, the most predominant denominations are United Church (28.33%) and Seventh Day Adventists (26.67%), closely followed by Catholics (25%) and South Seas Evangelists (21.67%).

In our sample villages, the vast majority of villagers (82%) depends on a subsistence economy. Other households sell food at nearby markets. In most villages, the three most important sources of income come from selling produce (fish, crops, livestock), cocoa/copra and other cash crops or from logging royalties. Most villages do not have access to electricity, running water or sanitation. The vast majority (80%) of households use rainwater catchments for drinking water, only have access to solar lamps for lighting their households, and defecate in the sea or the bush.

2.4. Balance of covariates between matrilineal and patrilineal villages

In Table A3, we present the balance of all the characteristics discussed thus far between matrilineal and patrilineal villages. In line with the discussion in the paper and the prediction that the number of offspring per family will be smaller under a

matrilineal system, the total number of people in a village is significantly smaller in matrilineal villages. On average, matrilineal villages are nearly half as populous as patrilineal villages, although neither the total number of tribal groups nor the total number of households are significantly different. Accordingly, household size is significantly smaller in matrilineal villages, with, on average, 6.5 people per household, against more than 11 in patrilineal villages (p-value of the difference in means around 10%). Consistent with the higher concentration of matrilineality in Western Province, we find a statistical difference in the language groups across matrilineal and patrilineal villages, this is not an issue for our analysis, as we control for language fixed effects.

There is no statistical difference between the political organisation of matrilineal and patrilineal villages, with traditional chiefs being predominant in both types of villages. We however find differences in the major religion practiced by matrilineal and patrilineal villages. Patrilineal villagers are more likely to come from Christian churches with broad global reaches, such as Anglican, Catholic, Uniting or Methodist churches, while matrilineal villagers are more likely to follow local Christian hybrid religions such as Charismatic Church, Solomon Island Seventh Day Adventist (SDA) and South Seas Evangelical Church (SSEC).

The share of households relying solely on a subsistence economy is slightly higher in matrilineal compared with patrilineal villages. Matrilineal villages are also more remote, with a travel time of 12 hours to the provincial capital compared to 7.2 hours in patrilineal villages, although this difference is not statistically significant. This is consistent with economic development and contact with more Western institutions leading to a transition from matrilineal to patrilineal inheritance, a phenomenon that has previously been noted in the literature (Levi-Strauss 1984), including in the Solomon Islands (Blust 1986-1987).

2.5. Reef Data

To identify a village's reliance on fishing, we measure the density of coral reefs in a 10km-radius of each village. We select a 10-km radius as a reasonable limit for a regular fishing trip on a paddleboat, the main fishing technology for the individuals in our Solomon Islands dataset. For consistency, we also use a 10-km radius for the SCCS analysis. The reef data is obtained from the Global Distribution of Coral Reefs (GDCR) (UNEP-WCMC 2010), a dataset compiled from a number of sources by the United Nations Environmental Programme-World Conservation Monitoring Centre and the World Fish Centre, in collaboration with the World Resources Institute and The Nature Conservancy. It is the most comprehensive global dataset of warm-water coral reefs publicly accessible. Due to variation in quality of the GDCR data the exact calculation of reef density in the vicinity of the Solomon Islands and SCCS villages differ, each is explained in turn below.

To examine the density of coral reefs in the locality of SCCS villages, we map and calculate distances between the SCCS societies and coral reefs. To calculate distances, we use QGIS software using the World Geodetic 1984 coordinate system, which is the standard coordinate reference system used by GPS devices. As mentioned, the GDCR data is compiled from a number of sources that vary in terms

of geometry and reef information. A number of locations do not contain information on reef type or quality. To overcome this issue we create a reef distance algorithm that calculates the total square kilometres of reef in a 10km radius of each village.

Reef data in the vicinity of the Solomon Islands is of higher quality, having been validated by the University of South Florida and the Institute de Recherche pour le Development (IRD) with support from NASA. The Solomon Islands reef data contains information on reef type (including barrier reef, patch reef and shelf reef) and reef depth (including whether the reef is shallow, variable or deep). Using QGIS, we overlay the reef shapefile with GPS coordinates of the villages included in the sample of our study in the Solomon Island. Using both nearest neighbour techniques and a distance matrix, we calculate the number of shallow reefs within a 10km radius of each village.

We focus our analysis on shallow reefs, as these are closest to shore and thus most accessible by villagers who are restricted to fishing by canoe or small paddleboats. Furthermore, other reef types are rare—each village is surrounded by on average 47 shallow reefs, compared to 0.01 deep water reefs (in a 10 kilometre radius). Moreover, shallow reefs are closer to villages, the average distance from a village to a shallow reef is approximately 7 km , compared to 11 km for deep water reefs. Lastly, reef-building corals generally grow best at depths shallower than 70 meters, with the most productive reefs growing at depths of 18–27 meters below sea level (NOAA 2014). Shallow water reefs are often found below 70 meters making them highly productive for fishing purposes.

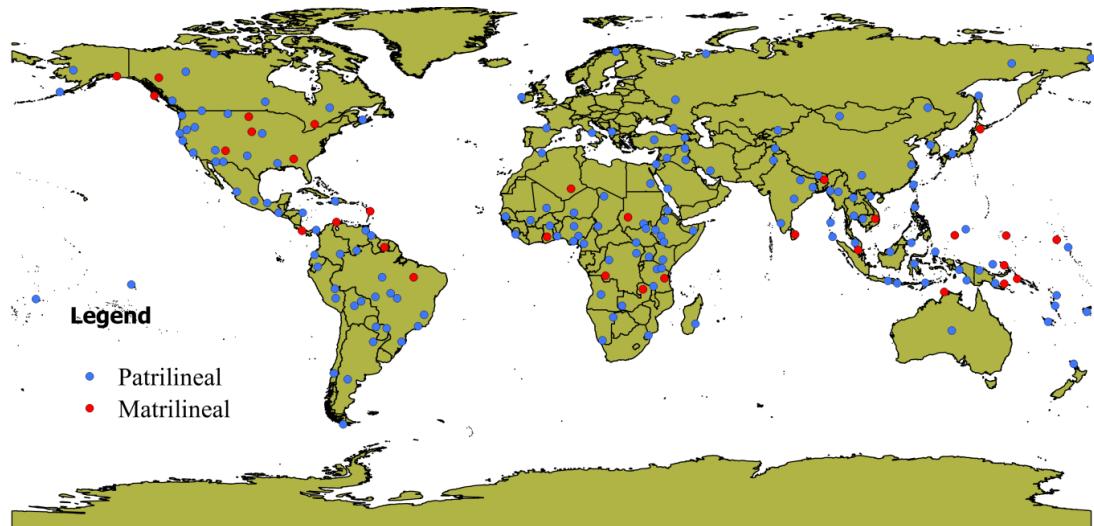
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3. Extra figures

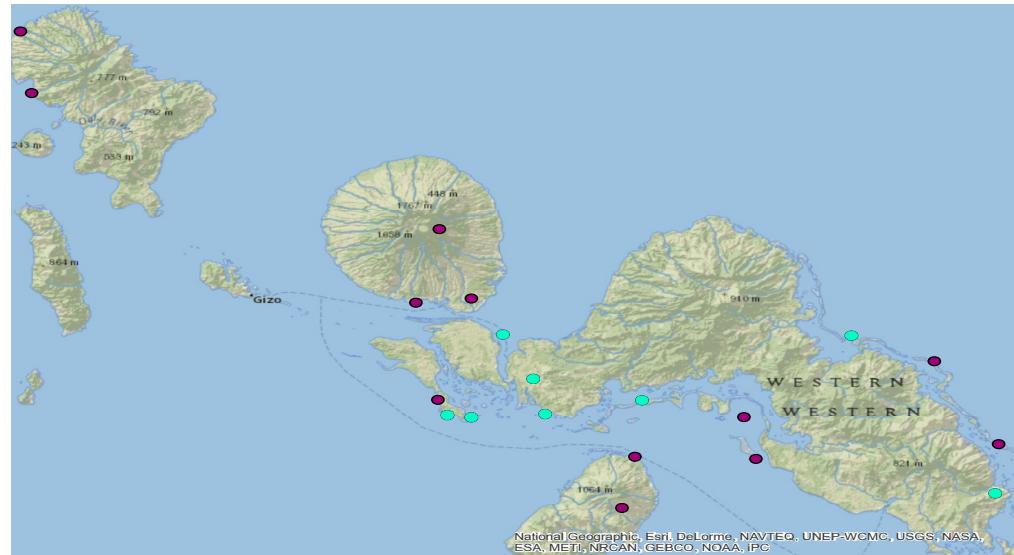
Figure A1: Matrilineal and Patrilineal Groups Across the World



Source: Murdock and White (1969)

Figure A2: Map of Sampled Villages in our Solomon Islands Study and Prevalence of Matrilineal Inheritance

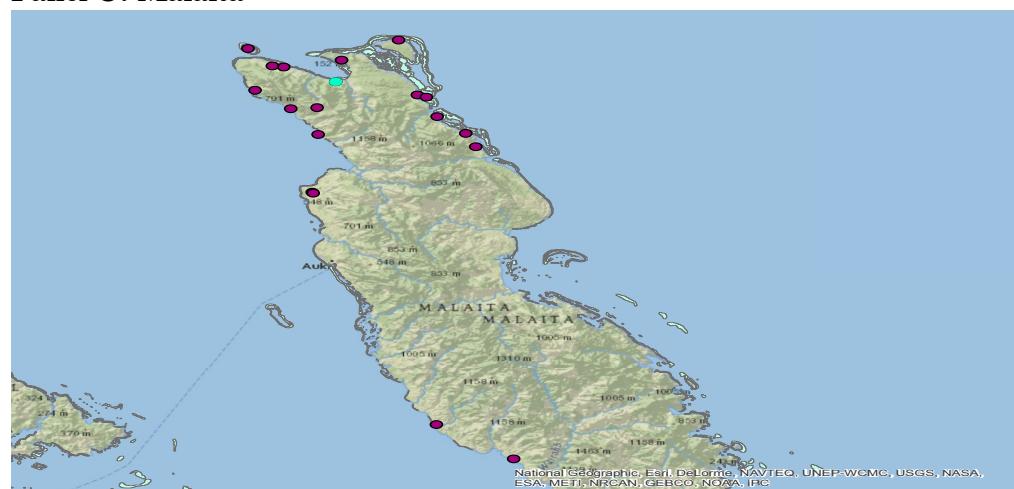
Panel A: Western Province



Panel B: Choiseul Province



Panel C: Malaita



Notes to Figure 2: Dots indicate survey sites. Red dots indicate patrilineal inheritance, and blue dots indicate matrilineal inheritance.

4. Extra tables and robustness

Table A1: Reef Density, Fishing, and Matrilineal Inheritance in the SCCS dataset

	(1) Dependence on Fishing	(2) Matrilineal
Square Km of Reef in 10 Km Radius	0.03*** (0.34) [0.01]	0.002* (0.13) [0.00]
Constant	1.58*** (0.13)	0.153*** (0.03)
Observations	186	186
R-squared	0.11	0.02

Notes: Coefficient estimates from OLS and linear probability regression presented in column 1 and 2 respectively. Column 1 reports the relationship between the density of reefs and societies' dependence on fishing. Column 2 reports the relationship between the density of reefs and societies' land inheritance. Standardized regression coefficients are in brackets. Robust standard errors in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. *Source:* (Murdock and White 1969)and (UNEP-WCMC 2010)

Table A2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Number of shallow reef in 10 km radius	59	41.20	29.44	0	97
<i>Social organisation</i>					
Patrilineal inheritance	58	0.78	0.42	0	1
Matrilineal inheritance	58	0.19	0.40	0	1
Mixed inheritance	58	0.03	0.18	0	1
Patrilocal post-marital residence	55	0.56	0.50	0	1
Matrilocal post-marital residence	55	0.07	0.26	0	1
Mixed post-marital residence	55	0.36	0.49	0	1
<i>Demographics</i>					
Number of people	58	487.67	585.12	28	3000
Household size	58	10.29	13.44	1	87.26
<i>Language</i>					
Central Solomons	57	0.07	0.26	0	1
Central Eastern Oceanic	57	0.39	0.49	0	1
Western Oceanic	57	0.53	0.50	0	1
Creole	57	0.02	0.13	0	1
<i>Political organisation and religion</i>					
Elected leader	59	0.08	0.28	0	1
Traditional village chief	59	0.86	0.35	0	1
Church leader	59	0.14	0.35	0	1
Village Committee	59	0.05	0.22	0	1
Anglican	59	0.05	0.22	0	1
Catholic	59	0.14	0.35	0	1
Charismatic	59	0.08	0.28	0	1
Methodist	59	0.07	0.25	0	1
SDA	59	0.17	0.38	0	1
SSEC	59	0.17	0.38	0	1
United Church	59	0.29	0.46	0	1
<i>Subsistence</i>					
Share HH living just from subsistence: 76-100%	54	0.81	0.39	0	1
Share HH living just from subsistence: 51-75%	54	0.15	0.36	0	1
Share HH living just from subsistence: 0-25%	54	0.04	0.19	0	1
Travel time to province capital (hours)	58	7.97	9.29	0.50	30
Iron roof	59	0.41	0.18	0	1
Enough food for everyone	58	0.92	0.11	0.60	1

Source: Authors' data

Table A3: Covariates in Matrilineal and Patrilineal Villages

Variable	Mean in Matrilineal Villages	Mean in Patrilineal Villages	Difference between Matrilineal and Patrilineal Villages	Difference in means P- value
Number of shallow reef in 10 km radius	66.909	34.277	32.632	0.000
<i>Social organisation</i>				
Patrilocal post-marital residence	0.3	0.622	-0.322	0.056
Matrilocal post-marital residence	0.2	0.044	0.156	0.246
Mixed post-marital residence	0.5	0.333	0.167	0.349
<i>Demographics</i>				
Number of people	292.5	533.191	-240.691	0.037
Household size	11.087	6.562	-4.252	0.109
<i>Language</i>				
Central Solomons	0.3	0.022	0.278	0.067
Central Eastern Oceanic	0.1	0.457	-0.357	0.005
Western Oceanic	0.6	0.522	0.078	0.656
<i>Political organisation and religion</i>				
Elected leader	0.182	0.064	0.118	0.345
Traditional village chief	0.727	0.915	-0.188	0.194
Church leader	0.364	0.064	0.300	0.053
Village Committee	0	0.064	-0.064	0.084
Anglican	0	0.064	-0.064	0.084
Catholic	0	0.170	-0.170	0.003
Charismatic	0.363	0.021	0.342	0.025
Methodist	0	0.064	-0.064	0.084
SDA	0.273	0.149	0.124	0.402
SSEC	0.182	0.170	0.012	0.930
United Church	0.09	0.340	-0.250	0.031
<i>Subsistence</i>				
Share HH living just from subsistence: 76-100%	1	0.791	0.209	0.002
Share HH living just from subsistence: 51-75%	0	0.163	-0.163	0.006
Share HH living just from subsistence: 0-25%	0	0.047	-0.047	0.161
Travel time to province capital (hours)	11.975	7.239	4.736	0.263
Iron roof	0.468	0.398	0.070	0.152
Enough food for everyone	0.963	0.904	0.059	0.049

Source: Authors' data

Table A4: Results (replica of Table 1): Full set of results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Matrilineal inheritance			Total Number of People in Village			Household size		
Number of shallowreefs in 10km radius	0.006*** (0.002)	0.005*** (0.002)	0.006** (0.003)						
Matrilineal inheritance				-240.691** (112.540)	381.036** (185.099)	-352.334+ (218.509)	-4.525+ (2.776)	-5.720+ (3.444)	-10.046* (5.453)
<i>Religion and political controls</i>									
Elected leader		0.135 (0.171)				-111.864 (136.283)			-2.087 (3.789)
Traditional village chief			0.127 (0.234)			46.014 (231.566)			4.670 (7.231)
Church leader				0.098 (0.218)		-222.039 (240.639)			-1.705 (3.439)
Village Committee				-0.233 (0.264)		168.764 (307.738)			-1.690 (6.972)
Anglican					0.088 (0.083)	1,479.450+ (998.893)			1.447 (2.906)
Catholic					-0.028 (0.092)	109.174 (287.701)			2.424 (5.459)
Charismatic					0.264 (0.183)	247.174 (186.144)			10.988 (8.526)
Methodist					-0.147 (0.170)	-299.451 (327.753)			2.876 (5.308)
Share HH living just from subsistence: 76-100%				0.197 (0.147)		115.550 (111.908)			1.197 (2.721)

Share HH living just from subsistence: 51-75%		-0.122		108.937		-9.278**
		(0.192)		(341.859)		(4.162)
<i>Language group fixed effects:</i>						
Central Eastern Oceanic		-0.538**	-0.478*	-458.593	-684.049	-2.093
		(0.254)	(0.282)	(424.904)	(480.559)	(3.156)
Western Oceanic		-0.424+	-0.305	-360.636	-408.536	4.324+
		(0.253)	(0.256)	(389.677)	(439.783)	(2.729)
Constant	-0.053	0.419+	0.009	533.191***	935.777**	843.035**
	(0.051)	(0.270)	(0.348)	(93.470)	(413.399)	(345.571)
p-value for Number of shallowreefs in a 10 km radius using (WCB6)		p=0.006	p=0.036			
p-value for matrilineal inheritance using (WCB6)				p=.234	p=0.216	p=0.048
Observations	58	56	52	57	56	52
R-squared	0.196	0.337	0.526	0.025	0.055	0.289
	0.016	0.068	0.143			

Notes: The unit of observation is a village. Coefficient estimates from OLS regression. Robust standard errors corrected for heteroskedasticity are reported in parenthesis. ***, **, * and + indicate statistical significance at the 1%, 5%, 10% and 15% level, respectively. Sources: See Table 1 in paper

Table A5: Robustness- Log of shallow reef and merged language group

	(1) Matrilineal	(2) Matrilineal	(3) Matrilineal	(4) Matrilineal	(5) Matrilineal
Ln (Number of shallow reef in a 10km radius)	0.139*** (0.043)	0.102** (0.039)	0.099** (0.044)		
Number of shallow reefs in 10km radius				0.005*** (0.002)	0.005* (0.003)
Elected leader			0.127 (0.180)		0.142 (0.158)
Traditional village chief			-0.047 (0.241)		-0.009 (0.251)
Church leader			0.233 (0.215)		0.116 (0.244)
Village Committee			-0.411 (0.269)		-0.338 (0.278)
Anglican			0.040 (0.115)		-0.043 (0.068)
Catholic			-0.053 (0.092)		-0.080 (0.088)
Charismatic			0.234 (0.228)		0.205 (0.234)
Methodist			-0.030 (0.128)		-0.094 (0.166)
Share HH living just from subsistence: 76-100%			0.166 (0.135)		0.304** (0.131)
Share HH living just from subsistence: 51-75%			-0.129 (0.166)		0.006 (0.140)
Central Eastern Oceanic		-0.596** (0.239)	-0.435 (0.271)		
Western Oceanic		-0.476* (0.239)	-0.300 (0.271)		

	(0.244)	(0.246)		
Central and Western Oceanic			-0.465*	-0.339
			(0.250)	(0.265)
Constant	-0.276** (0.118)	0.330 (0.280)	0.076 (0.351)	0.401 (0.269)
Observations	58	56	52	56
R-squared	0.137	0.280	0.484	0.317
				0.495

Notes: The unit of observation is a village. Coefficient estimates from OLS regression.. Robust standard errors corrected for heteroskedasticity are reported in parenthesis. Column 1-3 reports the relationship between the log of the number of shallow reefs in a 10km radius and matrilineal inheritance. Column 4 and 5 reports the relationship between the number of shallow reefs in a 10km radius and matrilineal inheritance controlling for languages (Central and Western Oceanic are combined into one group). ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. *Sources:* Authors' data.

4. Survey Instruments: Community Leaders' Survey

TO BE COMPLETED BY TEAM	
Data Collection Team Number:	Name of Village:
Province:	Planning Unit Number:
Ward Name:	Ward Number:
Sub-project Type:	Round/cycle number:
% Implementation completed:	Date started:
Latitude:	Topography: <input type="checkbox"/> Coastal/Lagoon <input type="checkbox"/> Inland Plains <input type="checkbox"/> Hills <input type="checkbox"/> Inland Valley
Longitude:	
Altitude:	
Village number:	

Participant Name	Role (Chief / SIC member / women rep.)

Part A. General information

A1	What is the main language spoken in this village? Wat na mein language ufala spikin lo ples blo yufala?	_____
A2	How many households live in this village? (need to probe and establish village in respondents mind, larger village not sub village) Hao meni haus nao lo vilij blo yu?	Number: _____
A3	How many people live in this village? (if not known, estimate) Hao meni pipol nao stap lo vilij blo yu?	Number: _____
A4	How many different tribal groups live in this village? Hao meni traebol grups na stap lo ples blo yu?	Number: _____
A5	How is land inherited in this village? Hao na yufala garem onasip lo lan lo ples blo u?	<ol style="list-style-type: none"> 1. <input type="checkbox"/> Father 2. <input type="checkbox"/> Mother 3. <input type="checkbox"/> Both
A6	When people in this village marry, does the couple live in the bride's village or in the groom's village? Taem pipol lo ples blo u olketa marit olketa stap togeta lo ples blo mere o olketa stap lo ples blo man?	<ol style="list-style-type: none"> 1. <input type="checkbox"/> Bride 2. <input type="checkbox"/> Groom 3. <input type="checkbox"/> It depends
A7a	When people marry, does the family of the groom have to pay for the wife, or does the family of the wife pay the family of the groom? Taem olketa pipol lo ples blo yu maret, waswe famili blo man bae peim gele o famili blo gele peim man?	<ol style="list-style-type: none"> 1. <input type="checkbox"/> Bride's family (dowry) 2. <input type="checkbox"/> Groom's family (bride price) 3. <input type="checkbox"/> It depends 4. <input type="checkbox"/> Both
A7b	When people in this village marry, who has to pay for most of the wedding celebrations (i.e. feast, ceremony)? Taem pipol maret, hu na peim staka samting fo taem wedding?	<ol style="list-style-type: none"> 1. <input type="checkbox"/> Bride's family 2. <input type="checkbox"/> Groom's family 3. <input type="checkbox"/> It depends 4. <input type="checkbox"/> Both

A8	What percentage of land in this village is customary? Wat percentage lo lan na hem kastomari?	1. <input type="checkbox"/> 76 – 100% 2. <input type="checkbox"/> 51 – 75% 3. <input type="checkbox"/> 26 – 50% 4. <input type="checkbox"/> 0 – 25%
A9	How long have people been settled in this village? (How long has this village existed) Hao long na pipol bin stap lo disfala ples?	1. <input type="checkbox"/> 0 to 10 years 2. <input type="checkbox"/> 11-40 years 3. <input type="checkbox"/> 41-70 years 4. <input type="checkbox"/> 71-100 years 5. <input type="checkbox"/> > 100 years/forever 98. <input type="checkbox"/> Don't Know
A10	Who governs this village? <u>(Mark all that apply)</u> Hu na lukaftam disfala ples?	1. <input type="checkbox"/> Elected leader 2. <input type="checkbox"/> Traditional/Custom/Paramount (non elected) Chief 3. <input type="checkbox"/> Church leader 4. <input type="checkbox"/> Village committee 5. <input type="checkbox"/> Other: _____
A11	What are the main denominations in this village? <u>(Mark all that apply and give percentage of the people belonging to each)</u> Wat na olketa mein lotu lo ples blo u?	1. <input type="checkbox"/> Anglican Church _____ % 2. <input type="checkbox"/> Catholic _____ % 3. <input type="checkbox"/> Charismatic Church _____ % 4. <input type="checkbox"/> Methodist _____ % 5. <input type="checkbox"/> Seventh Day Adventist _____ % 6. <input type="checkbox"/> SSEC _____ % 7. <input type="checkbox"/> United Church _____ % 8. <input type="checkbox"/> Other: _____
A12	How many people from this village live as migrants in Honiara? (live permanently in Honiara; If not known, provide estimate; mark 0 for “none”) Hao meni pipol lo ples blo u nao stap olsem migrants lo Honiara	Number: _____
A13	Has this village been impacted by the following natural hazards within the last year? <u>(Mark all that apply)</u> In saed lo las yia hao meni taem ma disasta kasem yufala?	1. <input type="checkbox"/> Drought 2. <input type="checkbox"/> Earthquake 3. <input type="checkbox"/> Flood 4. <input type="checkbox"/> Typhoon 5. <input type="checkbox"/> Landslide/debris flow 6. <input type="checkbox"/> Tsunami 7. <input type="checkbox"/> Heavier than usual rain 8. <input type="checkbox"/> Volcano eruption

Part B. Economic Activities

B1	<p>What are the main sources of money/ cash for people in this village?</p> <p>(Please write in your selection, order of importance is determined by what is the main and consistent source of income)</p> <p>Wat na samfala mein sos blo seleni fo pipol lo ples blo u?</p>	<ul style="list-style-type: none"> a. Sell produce in markets (crops, livestock, fish, marine products) b. From family/Wantok/Friends c. Paid Work d. Businesses e. Cocoa/Copra other cash crops f. Logging royalties/sawn timber g. Shell money/crafts h. Churches i. Mining prospecting <p>(Use numbering as code)</p> <p>1. _____</p> <p>Most important source ></p> <p>2. _____</p> <p>Second most important source ></p> <p>3. _____</p> <p>Third most important source ></p>
B2	<p>What percent of people in this village depend on the subsistence economy? (or semi-subsistence)</p> <p>Hao meni percent lo ples blo u nao dipend lo subsistence farming?</p> <p>(provide examples)</p>	<ul style="list-style-type: none"> 1. <input type="checkbox"/> More than 75% 2. <input type="checkbox"/> 51 – 75% 3. <input type="checkbox"/> 26 – 50% 4. <input type="checkbox"/> 0 – 25%
B3	<p>How many businesses are there in this village? (Write type and number)</p> <p>Hao meni taep bisnis nao ples blo u?</p>	<p>Type: _____ Number: _____</p>
B4	<p>How many of the businesses listed above are owned by women?</p> <p>Hao meni lo olketa bisnis ya nao olketa woman onam?</p>	<p>Number: _____</p>

B5	<p>How many of the businesses listed above are jointly owned by women? (husband and wife together, family)</p> <p>Hao meni lo olketa bisnis ya nao olketa woman onam?</p>	Number: _____
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Part C. PARTICIPATION / ELECTIONS

C1	<p>In the last 5 years, has this village benefited from:</p> <p>Insaed, las faev yias disfala ples nem benefit long</p> <p>a) Rural Water and Sanitation (RWSS) Project?</p> <p>b) Other Provincial Government Project?</p> <p>c) Rural Advancement Micro project (RAMP), or MPP1, MPP2?</p> <p>d) Constituency Fund Project?</p> <p>e) Project by NGO?</p> <p>f) Other Donor?</p> <p>g) National Government?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes</p>
C2	<p>Is anybody in this village involved with logging activities?</p> <p>Lo ples blo yu eni logging o timber milling activities take ples?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes - skip to C4</p>
C3	<p>Have there been enquiries in this village about potential logging activities?</p> <p>Ufala toktok abaothem logging o milling activities lo ples blo u?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes</p>

C4	Is anybody in this village involved with mining prospecting? Lo ples blo u garem mining prosepecting?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes - skip to C6
C5	Have there been enquiries in this village about potential mining prospecting? U garem toktok abaotem potential mining prospecting le ples blo u?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes
C6	Who is the MP who represents this village? Who na memba blo ufala?	
C7	How many times did this MP visit this village over the last year? (Mark 0 for “never”) Hao meni taems nao memba blo u bin visitim ples blo u lo las yia?	
C8	Does this MP have family members in this village? (nuclear or extended family) Memba blo u garem famili o wantok members lo ples blo u?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes
C9	Did the majority of people in this village vote for the current MP? Waswe, staka pipol lo ples blo u nao votim memba blo u?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know
C10	Did this village benefit from distribution of food and goods by this MP? Waswe, village blo u benefit lo goods wea memba givin kam?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes
C11	How many times did the MPA for this village visit this village over the last year? (Mark 0 for “never”) Hao meni taems na MPA lo ples blo you visitim u las yiar?	
C12	Did this village benefit from a development project led by this MPA? Lo ples blo yu benifit lo development project wea MOA givim kam?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes
C13	Did this village benefit from distribution of food and goods by this MPA? Lo ples blo yu benifit lo goods wea MPA givin kam?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes

C14	How often are religious services held in this village, on average? Hao meni taems lo 1 wik/1 manis nao rilgis sevices save happen lo vilij blo u?	_____ per <input type="checkbox"/> Week <input type="checkbox"/> Month
C15	How often does the Church distribute food packages or other goods, approximately? Hao meni taems ma Church givem aut kaikai or goods?	1. <input type="checkbox"/> Never, no distribution 2. <input type="checkbox"/> Once a year 3. <input type="checkbox"/> Several times a year but less than once a month 4. <input type="checkbox"/> Once a month 5. <input type="checkbox"/> Once a week or more

Part D Access to Infrastructure and services

D1	Has your household's access to primary school and kindy improved during the past few years? (e.g. New or renovated kindy of school building, new bridge, land or sea transport better etc.) <i>Waswe, haushol blong iu access iu primary skul and kinoli wea hem impruvred lo las dast yias?</i>	0. <input type="checkbox"/> No - Skip to D4 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't Know - Skip to D4
D2	If Yes how has it improved?	
D3	Who funded the improvement? (funded not built) (Mark all that apply) <i>Hu na famdim disfala projea ia?</i>	1. <input type="checkbox"/> RDP 2. <input type="checkbox"/> Community 3. <input type="checkbox"/> Other _____ 98. <input type="checkbox"/> Don't Know
D4	Has your household's access to Health Care improved during the past few years? (New or renovated buildings, staff houses, bridge, transport etc improved service - nurses medicines or equipment etc) <i>Waswe haushol biomg iu access tu lo helt care. Wea hem impruvred lo las past yias?</i>	0. <input type="checkbox"/> No - Skip to D7 1. <input type="checkbox"/> Yes, 98. <input type="checkbox"/> Don't Know - Skip to D7
D5	If Yes, how has it improved?	
D6	Who funded the improvement? (funded not built) <i>Hu na famdim disfala projea ia?</i>	1. <input type="checkbox"/> RDP 2. <input type="checkbox"/> Community 3. <input type="checkbox"/> Other _____ 98. <input type="checkbox"/> Don't Know

D7	Have the roads, bridges and wharfs around the village improved during the past few years? <i>Waswe rods bridges and waf raunim vilis ia hem impruv lo las past yias?</i>	0. <input type="checkbox"/> No - Skip to D10 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't Know - Skip to D10
D8	If Yes how has it improved?	
D9	Who funded the improvement? (funded not built) <i>Hu na famdim disfala projea ia?</i>	1. <input type="checkbox"/> RDP 2. <input type="checkbox"/> Community 3. <input type="checkbox"/> Other _____ 98. <input type="checkbox"/> Don't Know
D10	Has your households access to clean drinking water improved during the past few years? <i>Waswe haushol blo u hem access lo kiln drinking wata lo las past yias?</i>	0. <input type="checkbox"/> No - Skip to D13 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't Know - Skip to D13
D11	If Yes how has it improved?	
D12	Who funded the improvement? (funded not built) <i>Hu na famdim disfala projea ia?</i>	1. <input type="checkbox"/> RDP 2. <input type="checkbox"/> Community 3. <input type="checkbox"/> Other _____ 98. <input type="checkbox"/> Don't Know
D13	Has your household's access to sanitation facilities improved during the past few years?	0. <input type="checkbox"/> No - Skip to D16 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't Know - Skip to D16
D14	If Yes how has it improved?	
D15	Who funded the improvement? (funded not built) <i>Hu na famdim disfala projea ia?</i>	1. <input type="checkbox"/> RDP 2. <input type="checkbox"/> Community 3. <input type="checkbox"/> Other _____ 98. <input type="checkbox"/> Don't Know
D16	Has your households access to electricity /power / solar improved during the past few years? <i>Waswe haushol bio u access tu lo electrik wea hem impruv lo las past yias?</i>	0. <input type="checkbox"/> No - Skip to D19 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't Know - Skip to D19

D17	Who funded the improvement? (funded not built) <i>Hu na famdim disfala projea ia?</i>	1. <input type="checkbox"/> RDP 2. <input type="checkbox"/> Community 3. <input type="checkbox"/> Other _____ 98. <input type="checkbox"/> Don't Know
D18	If Yes how has it improved?	
D19	Has there been improvements to the community meeting place during the past few years? (New structure, renovations etc) <i>Dia lo las past yias komiumiti miting ples blo is fala hem impruv tu?</i>	0. <input type="checkbox"/> No - Skip to E1 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't Know - Skip to E1
D20	If Yes how has it improved?	
D21	Who funded the improvement? (funded not built) <i>Hu na famdim disfala projea ia?</i>	1. <input type="checkbox"/> RDP 2. <input type="checkbox"/> Community 3. <input type="checkbox"/> Other _____ 98. <input type="checkbox"/> Don't Know

Part E. Organization for RDP Subprojects

Now I want to talk to you about the RDP subproject/s this community has been involved with the construction of.

E1	How often did you hold meetings to inform the community about the progress of the project? <i>Hao Meni taem nao iu holem miting fo letem pipol save aboutem project waka?</i>	1. <input type="checkbox"/> Frequently 2. <input type="checkbox"/> Sometimes 3. <input type="checkbox"/> Rarely 4. <input type="checkbox"/> Not at all
E2	What did you discuss at those meetings? (<u>mark all that apply</u>) <i>Wat nao iu discasim lo taem lo meeting?</i>	1. <input type="checkbox"/> Work schedule 2. <input type="checkbox"/> Community contributions 3. <input type="checkbox"/> Contractors 4. <input type="checkbox"/> The use of RDP Funds 5. <input type="checkbox"/> Technical design 6. <input type="checkbox"/> Raising additional funds 7. <input type="checkbox"/> Other _____
E3	Who attended the meetings? (<u>mark all that apply</u>) <i>Oketa hu nao kam lo miting</i>	1. <input type="checkbox"/> Community leaders only 2. <input type="checkbox"/> SIC only 3. <input type="checkbox"/> Men 4. <input type="checkbox"/> Women 5. <input type="checkbox"/> Youths 6. <input type="checkbox"/> All (everybody)

E4	<p>Who organized and coordinated the community contribution, labour, raw materials money etc within the community?</p> <p>Hu nao hem waka fo organaesim an coodinatim waka fo komuniti lo saed lo leiba, raw materials ad saed lo seleni?</p>	<ol style="list-style-type: none"> 1. <input type="checkbox"/> Chief/community leaders 2. <input type="checkbox"/> SIC 3. <input type="checkbox"/> SIC through the Chiefs/leaders 4. <input type="checkbox"/> Contract a group 5. <input type="checkbox"/> CH 6. <input type="checkbox"/> Other _____
E5	<p>Was information about the project posted/displayed in a public space for community members to see?</p> <p>Waswe, lu talem toktok abaoatem project lo pablik ples fo komuniti memba fo lukim?</p>	<ol style="list-style-type: none"> 0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes
E6	<p>Was having a SIC an effective way of coordinating the subproject implementation?</p> <p>Waswe fo garem SIC hem effective we fo coodinatim subproject implementation?</p>	<ol style="list-style-type: none"> 0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes
E7	<p>Can you recommend a better option than having a SIC? If so what?</p> <p>Waswe u save talem eni nara gud tingting</p>	_____
E8	<p>Other than <sub-project funded by RDP>, have people in this village participated in the selection of projects in the past four years?</p>	<ol style="list-style-type: none"> 0. <input type="checkbox"/> No - Skip to E11 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know
E9	<p>What was the name of the program that funded this project?</p>	_____
E10	<p>If any, describe the benefits of the selection process for this project in comparison to RDP?</p>	_____
		98. <input type="checkbox"/> Don't know
E11	<p>Only ask this at villages with terminated subprojects otherwise skip to E12</p> <p>Why was the subproject was terminated? (open ended – ask what they think the reasons for the termination were)</p>	_____

E12	<p>Did community members support the SIC's efforts by providing raw materials and their labour as and when needed?</p> <p>Waswe komuniti hem sapotim SIC waka an providim materials an leiba taem nidim?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes</p>
E13	Explain the reason for your last answer. (if yes, explain why, if no explain why)	
E14	<p>Do you think RDP processes enables women to influence decision-making more than other community projects?</p> <p>Waswe, iu tingim RDP process mekem olketa mere fo garem decision makin go moa den nara komuniti projects?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know –Skip to E16</p>
E15	If YES explain how, If NO, then why not? Sapos ya explen hao, sapos namoa explenim wae?	
E16	<p>Did/do you have any women as members of your SIC?</p> <p>Waswe, iu garem mere olsem hem memba blo SIC blo iu?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know</p>
E17	If so, was/is this their first major community responsibility? Sapos ya, waswe hem fest major komuniti waka?	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know</p>
E18	If there was/is a women on the SIC, has her/their activity in the village changed since joining the SIC? Sapos mere go hem insaed lo SIC waswe waka lo komuniti hem change sins hem joinim SIC?	<p>1. <input type="checkbox"/> More active 2. <input type="checkbox"/> Same as before 3. <input type="checkbox"/> Not as active 98. <input type="checkbox"/> Don't know</p>
E19	If there was/is a women on the SIC, has her/their activity outside of the village changed since joining the SIC? Sapos mere go insaed lo SIC, waswe waka blo hem aotsaed lo komunity change sins hem joinim SIC?	<p>1. <input type="checkbox"/> More active 2. <input type="checkbox"/> Same as before 3. <input type="checkbox"/> Not as active 98. <input type="checkbox"/> Don't know</p>

E20	<p>Do you think women who participated in the SIC increased their status in the community?</p> <p>Waswe, iu ting mereusud tekpat lo waka blo SIC, insaed komuniti, bae pipol tingting hae lo hem tu?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know</p>
E21	<p>Was the CH important in the process and a help with the subproject implementation?</p> <p>Waswe, komuniti helper hem impotant tu loiosaed blo waka lo komuniti wetem subproject implimentation?</p>	<p>0. <input type="checkbox"/> No - skip to E22 1. <input type="checkbox"/> Yes - skip to E23 98. <input type="checkbox"/> Don't know</p>
E22	<p>In what ways did they assist?</p> <p>Wat kaen wei nao ya?</p>	
E23	<p>Explain why they were not useful</p> <p>Why nao hem no useful?</p>	
E24	<p>Were there any disagreements or disputes before or during the construction?</p> <p>Waswe, eni disagreement an disputes before o during construction waka?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes</p>
E25	<p>If yes what were those disagreements over? (mark all that apply)</p> <p>Sapos ya, wat nao olketa disagreement abaoitim?</p>	<p>1. <input type="checkbox"/> The subproject design 2. <input type="checkbox"/> Selection of contractor 3. <input type="checkbox"/> Land 4. <input type="checkbox"/> Community contribution 5. <input type="checkbox"/> Raw materials (sand, timber etc) 6. <input type="checkbox"/> Labour 7. <input type="checkbox"/> Use of funds 8. <input type="checkbox"/> SIC members 9. <input type="checkbox"/> Other _____</p>
E26	<p>How were these disagreements resolved?</p> <p>Hao nao olketa disagreement hem stret?</p>	<p>1. <input type="checkbox"/> Chiefs or elders 2. <input type="checkbox"/> SIC 3. <input type="checkbox"/> CH 4. <input type="checkbox"/> RDP 5. <input type="checkbox"/> Church 6. <input type="checkbox"/> Family 7. <input type="checkbox"/> Other _____</p>

E27	<p>What were the two main challenges you faced during the subproject implementation. (mark the 2 main ones)</p> <p>Waswe, wat nao mein samting iu fesim taem subproject hem waka?</p>	<ol style="list-style-type: none"> <input type="checkbox"/> Community participation <input type="checkbox"/> Contractor not performing <input type="checkbox"/> Purchasing materials <input type="checkbox"/> Managing finances/book keeping <input type="checkbox"/> Getting raw materials from community (contribution) <input type="checkbox"/> SIC not working/ inactive <input type="checkbox"/> RDP procedures <input type="checkbox"/> Community politics <input type="checkbox"/> Other _____
E28	<p>Where did you purchase the majority of the materials needed for the subproject? (Mark one)</p> <p>Waswe, wea nao iu beim staka samting wea iu nidim fo subproject?</p>	<ol style="list-style-type: none"> <input type="checkbox"/> Honiara <input type="checkbox"/> Provincial capital <input type="checkbox"/> Other _____
E29	<p>What is the main form of transport from your village to the provincial centre? (Mark one)</p> <p>Waswe, wat nao mein fom of transport iu usim from vilij blo iu kasem provincial centre?</p>	<ol style="list-style-type: none"> <input type="checkbox"/> Ship <input type="checkbox"/> OBM canoe <input type="checkbox"/> Paddle canoe <input type="checkbox"/> Car/truck <input type="checkbox"/> Tractor <input type="checkbox"/> Walk <input type="checkbox"/> Others _____
E30	<p>How long does it take you to travel from your village to the provincial centre?</p> <p>Hao long nao savve tekem iu from vilij blo iu go kasem provencial centre?</p>	Days _____ Hours _____
E31	<p>How long does it take you to travel from your village to Honiara?</p> <p>Hao long nao savve tekem iu from vilij blo u go kasem Honiara?</p>	Days _____ Hours _____
E32	<p>How often/regularly does the ship (boat) travel to this village (or close to it)?</p> <p>Waswe, hao meni taems nao ship(boat) savve tekem yu fo go kasem difala vilij (o clos lo hem)?</p>	<p>_____ times per:</p> <ol style="list-style-type: none"> <input type="checkbox"/> Week <input type="checkbox"/> Month <input type="checkbox"/> 6 months <input type="checkbox"/> Not applicable
E33	<p>How long did it take to purchase the materials needed?</p> <p>Hao long nao savve tekem fo peim oketa material wea nidim?</p>	months
E34	<p>Were the purchased materials required for the project readily available locally?</p> <p>Waswe, olketa materials nidim fo disfala project, hem available locally?</p>	<ol style="list-style-type: none"> <input type="checkbox"/> No <input type="checkbox"/> Yes –Skip to E36

E35	If the materials were not readily available locally, how did you solve this problem? (Open ended) Sapos materials fo project hem no avaialble locally, hao nao bae iu savve solvem problem?	
E36	Would you prefer if someone else had purchased the materials for you? Iu laekem samwan els nao for peim kam materials fo iu?	0. <input type="checkbox"/> No - Skip to E38 1. <input type="checkbox"/> Yes
E37	if YES, then who? Sapos ya, hu nao iu laekem?	
E38	Did you hire a contractor for the subproject? Waswe, iu haerem contractor fo subproject?	0. <input type="checkbox"/> No – Skip to E40 1. <input type="checkbox"/> Yes
E39	If YES, how satisfied are you with the contractor's performance? (complete work on time, did a good job, manage material and fund well, etc) Sapos ya, waswe iu satisfae tu wetem waka blo hem?	1. <input type="checkbox"/> Very satisfied 2. <input type="checkbox"/> Satisfied 3. <input type="checkbox"/> Not satisfied
E40	Was the land needed for the subproject readily available? (land for project not problematic) Was we lan fo subproject hem redi finis?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes – skip to E42
E41	If not, how was the land use resolved? Sapos namoa, hao nao bae heus resolve?	
E42	Please comment on the technical quality of construction in comparison to other similar infrastructure built in the community or nearby? Plis, mekem teknikol kuality lo construction waka comperem wetem nara samting wabild lo komuniti or ples klosap.	1. <input type="checkbox"/> Same 2. <input type="checkbox"/> Better 3. <input type="checkbox"/> Worse

E43	What were the reasons for your last answer? (Open ended)	
E44	Who in the community may use the subproject? <i>(mark all that apply)</i> Waswe, hunao lo komuniti bae usim subproject?	1. <input type="checkbox"/> Men 2. <input type="checkbox"/> Women 3. <input type="checkbox"/> Children 4. <input type="checkbox"/> Everybody 5. <input type="checkbox"/> Other: _____
E45	Do community members have to pay to use it? Waswe, komuniti memba bae peim fo usim ?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes
E46	Do people from outside the community have to pay to use it? Waswe, pipol aoutsaed icomuniti bae pei fo usim?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes
E47	If YES in D44 or D45 – what is the money used for? Sapos ya lo D44 o D45, wat nao seleni used fo?	1. <input type="checkbox"/> Replacement parts/materials 2. <input type="checkbox"/> Pay someone to maintain 3. <input type="checkbox"/> Other community projects 4. <input type="checkbox"/> Other _____
E48	Is there anything else that limits who may use It? Waswe, eni samting moa stopem fo hu nao bae usim?	0. <input type="checkbox"/> No – Skip to E50 1. <input type="checkbox"/> Yes
E49	Explain what limits who may use it. (Open ended)	
E50	Has any maintenance already been carried out on this subproject? Waswe, eni waka hem bin careaotfinis lo disfala subproject?	0. <input type="checkbox"/> No – Skip to E52 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know – Skip to E52 99. <input type="checkbox"/> Not needed yet- Skip to E52
E51	What maintenance has been carried out?	

E52	Is there a plan for future maintenance of this subproject? (O&M Plan) Waswe, eni futsa plan fo gud disfala subproject?	0. <input type="checkbox"/> No – Skip to E55 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know – Skip to E55
E53	If so, from where will the funds for the maintenance come? <i>(Mark all that apply)</i> Sapos olsem, wea nao bae tekem seleni for mekem gud?	1. <input type="checkbox"/> Every household with access (monthly fee) 2. <input type="checkbox"/> Individuals when they use it 3. <input type="checkbox"/> Fundraising 4. <input type="checkbox"/> Others: _____
E54	Who will be responsible for carrying it out? Waswe, hu nao bae hem responsible fo carem aot?	1. <input type="checkbox"/> SIC 2. <input type="checkbox"/> Other committee 3. <input type="checkbox"/> Chief/community leader 4. <input type="checkbox"/> Individual 5. <input type="checkbox"/> Other: _____
E55	Is there an operations and maintenance plan for other similar infrastructure (non RDP funded) in the village? Waswe, eni opareson an mentenes plan fo olketa semsem waka lo vilij?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know
E56	Did any Government Ministries/department (education, health, etc.) agree to provide support to your project (e.g. supply staff)? Waswe eni Garmen depatment olsen educason, helt etc olketa agree fo help sapotim project blu iu e.g givim kam staff o waka man?	0. <input type="checkbox"/> No – Skip to E58 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know – Skip to E58
E57	If so, to what extent has this support been provided? (by ministry/department) Sapos olsem, wat nao disfala suport bae provaedem?	1. <input type="checkbox"/> Fully provided 2. <input type="checkbox"/> Partially provided 3. <input type="checkbox"/> Not provided at all 4. <input type="checkbox"/> Too early (subproject not complete) 98. <input type="checkbox"/> Don't know
E58	Was there any benefit in the SIC having a subproject bank account? Waswe, eni benefit lo SIC sapos gavem subproject bank AC?	0. <input type="checkbox"/> No – Skip to E60 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know – Skip to E60
E59	What were the benefits? (<i>Mark all that apply</i>) Sapos ya, wanem?	1. <input type="checkbox"/> Learnt some accounting 2. <input type="checkbox"/> Learnt to use cheques 3. <input type="checkbox"/> Easier to use money 4. <input type="checkbox"/> Other: _____

E60	<p>Is this the first bank account held by the community Was, diwan hem fes bank A/C komuniti holem?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know</p>
E61	<p>Does the community plan to keep a bank account after the RDP program is completed? Waswe, konuniti plan fo kipim bank A/C afta RDP program hem complet?</p>	<p>0. <input type="checkbox"/> No – Skip to E63 1. <input type="checkbox"/> Yes 2. <input type="checkbox"/> Maybe 98. <input type="checkbox"/> Don't know – Skip to E64</p>
E62	<p>If YES or MAYBE, what will the account be used for? Sapos ya, wat nao bae A/c hem used fo?</p>	<p style="text-align: right;">--- Skip to E64 ---</p>
E63	If NO why not (explain).	
E64	<p>As a result of the community planning process used by RDP has this village put other development proposals to ward members, MPs or other sources, for funding? Olsem resalt blo komuniti planing process wea RDP usins, was we vilij putim nava development proposal go lo ward membis, MPS o nara ples moa wea save tekem funding?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know</p>
E65	<p>How likely is it that you will be able to apply the procurement experience from RDP to another community project? Waswe, hao nao bae iu save aplaem procurement experience from RDP go lo nara Komuniti project?</p>	<p>1. <input type="checkbox"/> Highly likely 2. <input type="checkbox"/> Somewhat likely 3. <input type="checkbox"/> Unlikely 98. <input type="checkbox"/> Don't know</p>
E66	<p>Is there another RDP subproject in another village close by, that people from this village have access to and use (or will use when complete)? Waswe, eni nara RDP subproject lo vilij klosap wea pipol from disfala vilij garem access fo usim o bae usim taem finis?</p>	<p>0. <input type="checkbox"/> No – Skip to E69 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know</p>
E67	<p>Were people from this village involved in the selection of that subproject in the other village? Sapos ya, waswe pipol lo komuniti lohia involved fo selection datfala subproject?</p>	<p>0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know</p>

E68	<p>Were people from this village involved in providing community contribution (raw materials, labour etc) for that subproject in the other village?</p> <p>Waswe pipol lo komuniti blo iu help fo contribute lo raw materials, leiba etc fo disfala subproject?</p>	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know
E69	<p>How satisfactory did the range of subproject options eligible under RDP meet or fulfil the needs of your community? (Eligible subproject projects include: staff houses of school, clinics, water supplies, jetty, footbridges etc with funding range of \$100,000 to \$180,000).</p> <p>Waswe , wat nao samfala samting o we wea save mekem gud fo RDP funded komuniti projects hemgud fo mitim nids blo vilij?</p>	1. <input type="checkbox"/> Very satisfactory 2. <input type="checkbox"/> Satisfactory 3. <input type="checkbox"/> Somewhat satisfactory 4. <input type="checkbox"/> Unsatisfactory
E70	<p>If you could pick one project or activity which is a priority for the village, but you don't think that it would be eligible under RDP, what would it be? It has to be something that would cost about the same amount as the RDP project (less than \$180,000).</p> <p>Sapos iu save pikim wanfala project waka wea hem prioriti to vilij/komuniti bat hem no fitim RDP wat nao ya? Hem mas samting klosap semsem amount olsem RDP project?</p>	
E71	<p>If you could change one thing about the RDP procedures and processes for selection and construction, what would it be?</p> <p>(Open ended, pick the most important i.e. only one.)</p>	

F. Local Skills

Now I want you to think about the skills people in your community have to improve local services.

Distaeem milaelcem project iu fo ting abaotem skills pipol lo komuniti garem fo improvem locol services

F1	If you wanted to repair or improve a local public building, is there a person in the community who could lead the design of this repair or improvement? Sapos iu laekem riperem o improvens local building, waswe, iu garem pipol insaed komuniti wea save ledim disaen blo disfala ripea o improvement?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know
F2	If you wanted to improve your water supply by installing a new standpipe, is there a person in the community who could lead the design of this standpipe? Sapos iulaekem improvem wata suplae blo iu fo instolim ew stanbaeo, waswe iu garem pipol insaed komuniti wea save lidim disaen blo disfala paep?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know
F3	Is there a person in the community who would be able to manage a bank account and the finances for this standpipe? Waswe, iu garem pipol insaed komuniti blo iu wea save lukafterarem bank account an seleni blo disfala paep?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know
F4	Is there a person in the community who could purchase/buy, the pipes and other supplies from a hardware store? Waswe, iu garem pipol wea save baem paeps an samfala nara samting moa from hardware store?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know
F5	Is there a person who could perform any maintenance on the standpipe after it was built, if it were to break? Waswe, iu garem pipol wea save doins eni waka lo saed lo mentenens lo paep afta tiem built an sapos hem brek?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know
F6	In your view, have the skills of the SIC members improved since the beginning of the RDP subproject? Waswe, lo tingting blo iu, save blo SIC membass hem improv tu sins lo bigining blo RDP subproject?	0. <input type="checkbox"/> No 1. <input type="checkbox"/> Yes 98. <input type="checkbox"/> Don't know