“Au ume ma au ena”: my house and my mother

An investigation of environmental health and the traditional use of the *ume kbubu* in relation to maternal and neonatal mortality conditions in South Central Timor

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**Abstract**
Using data from focus discussion groups gathered through field work, this paper examines key environmental health conditions across three specific rural and remote village communities in South Central Timor. Through a mixed methods approach, this study attempts to shed light on identified information gaps relating to maternal and neonatal health. The study adopts an environmental health framework which examines five main factors: these factors include access to clean water, draining, sanitation, management of rubbish, as well as access to roads and health facilities. Local community focus discussion groups across the three sample villages all identified access to clean water as the most important factor in relation to public health. Adequate draining was commonly ranked second most important largely due to the environmental health impacts of floods and contamination of water sources. Through a participatory research approach, the use of the traditional grass thatch hut granary or *ume kbubu* was also identified as a key focal point of this study. The process of *panggang*, a customary resting process for mothers and newborns within the *ume kbubu* was examined. The study found that in the past, the use of the *ume kbubu* as a resting place for mothers and their newborns has provided warmth and traditional medicinal benefits. However, the effects of the fire and smoke inside the well-insulated *ume kbubu* may also be perceived as a risk to maternal and neonatal health. No qualitative links were drawn between the use of the *ume kbubu* and perceptions of adverse health outcomes among community groups. The authors recommend further more detailed empirical investigations of environmental health conditions and the use of the *ume kbubu* in maternal and neonatal health in more remote villages.

**Keywords:** Environmental health, South Central Timor, maternal and neonatal health, *ume kbubu*, *panggang*, Dawan.
Introduction

This study examines community perspectives towards 5 factors of environmental health as well as the role of the *ume kbubu* traditional hut in the context of maternal and neonatal health challenges. Indonesia has the highest maternal mortality rate in South East Asia. Approximately 228 women die for every 100,000 live births (AIPMNH, 2016). In disadvantaged and peripheral provinces in Eastern Indonesia, the rates are more extreme (AIPMNH, 2016). This is demonstrated through data from the Central Bureau of Statistics (BPS NTT, 2013, pp. 152-155). In the Eastern Indonesian province of Nusa Tenggara Timur (NTT), the death rate is 306 women per 100,000 live births (BPS NTT, 2013, pp. 152-155). Neonatal mortality in NTT is also extremely high, at 3100 deaths per 100,000 live births (AIPMNH, 2016). Data from the NTT provincial Bureau of Statistics further highlights South Central Timor as the district with the highest number of infant deaths for 2012 with a total of 125 deaths (BPS NTT, 2013, pp. 152-155).

In 2012, TTS’ neonatal mortality reached 1.35% (BPS NTT, 2013, pp. 152-155). Most of these deaths were attributed to malnourishment, asphyxiation and infection (BPS NTT, 2013, pp. 152-155). Notably, a concerning 16.13% of the neonatal deaths in TTS: 15 deaths out of a total of 93 throughout 2012 were categorized as resulting from ‘other’ reasons (BPS NTT, 2013, pp. 152-155). This is a dilemma as it highlights a lack of detail in investigating the causes of neonatal death. Deaths placed within the category of ‘other’ may also may have greater likelihood of being easily preventable deaths. This investigation seeks to shed light on this previously unclear area relating to the underlying ‘other’ causes of maternal and neonatal mortality. In doing so, the study adopts an environmental health framework which is strengthened through a participatory research method. The role of traditional housing is also explored within the study. In particular, the function of the panggang process which involves mothers staying in the traditional *ume kbubu* huts for 40 days after child birth (Kause, 2013). In the past, this has become a particularly controversial issue. The debated use of the *ume kbubu* has come to symbolize a wider clash between external government intervention for modernization and local traditional customs and belief systems.

The conceptual framework used within this paper relates to environmental health and protection. This concept provides a more concrete understanding of the real life applications of environmental health. Environmental health and protection is defined as:

> the art and science of protecting against environmental factors that may adversely impact human health or the ecological balances essential to long-term human health and environmental quality. Such factors include, but are not limited to: air, food and water contaminants; radiation; toxic chemicals; disease vectors; safety hazards; and habitat alterations. (Gordon 2006).  

Environmental health conditions in Indonesia have suffered over the past decades. This pattern has been analysed in ‘Indonesia Betrayed: How Development Fails’, Elizabeth Collins (1999). Paundralinga (2009) further highlights how the formative economic push of the New
Order regime shaped the environmental health predisposition of Indonesia. The structural adjustments and liberalization of Indonesia were successful not only in increasing working class poverty and overexploitation of labour. They were also effective in creating a culture of environmental degradation through overexploitation, deforestation, and weak enforcement of environmental regulations such as draining, sanitation, and waste and rubbish management. The resulting government culture has consistently chosen industrialization over environmental protection and promotion of social welfare and public health (Paundralinga, 2009).

We begin our paper with a brief literature review outlining past relevant academic papers. Here we have identified a gap. There are a lack of studies which investigate these ‘other causes’ for maternal and neonatal mortality in South Central Timor. Research on the ume kbubu also remains limited. We have found even fewer studies which have adopted participatory research approaches which involve local communities in the shaping of the direction and questions asked within the research. The remainder of the paper is structured as follows: section 2 outlines three of the key background concepts including development gaps in Indonesia, environmental health conditions in South Central Timor and the role of the ume kbubu. Section 3 outlines the research method including the field work structure and the paper’s environmental health framework. Section 4 covers the results of the research and field work including the focus group discussions and participatory statistics.

Literature review

There have been a number of international reports which have assessed environmental health conditions in East Timor. Ardhikary (2002) in the report for the World Health Organisation has identified both water management and sanitation as key historic issues in East Timor. However, there have not yet been equivalent reports analyzing health conditions in South Central Timor (TTS). In addressing this gap, the paper provides a characterization of the environmental health conditions within a small sample of villages in TTS.

There are a range of studies on traditional housing in South Central Timor. Situmeang (2013), in her Masters thesis, provides a deep and insightful account of the primary use of the ume kbubu as a granary and kitchen. This is an important aspect of food security in TTS. In relation to the impact of the ume kbubu grass thatch hut on maternal and neonatal health, past literature yields more mixed results. Most controversial, is the role of panggang. The debate regarding the use of the ume kbubu for panggang processes has already come to symbolize a clash between local traditional belief and external government interventions for ‘healthy homes’ (Windi and Whittaker, 2012). Reports from external and national government agencies have argued for greater intervention measures to reduce the use of ume kbubu for traditional panggang processes (Soerachman and Wiryawan, 2013; Athena and Soerachman, 2014). One such paper identifies correlations between the use of ume kbubu for panggang and the occurrence of Respiratory Acute Infection (ISPA) on babies (Budiyono, 2004). However, none of these papers involve in-depth or long-term medical trails.
to provide sufficient evidence of causation between the use of the *ume kbubu* and *panggang* processes and resultant negative health outcomes.

In contrast to the external reports, are ethnographic studies which identify intrinsic cultural value within the use of the *ume kbubu* (Windi and Whittaker, 2012). This ethnographic approach examines the cultural and traditional beliefs of the Dawan people of Timor. Drawing on this ethnographic approach, this paper further highlights the dichotomy and controversy surrounding the role of the *ume kbubu*. Windi and Whittaker (2012) finds that the *ume kbubu* is fundamental to the “Dawan’s sense of psychosocial well-being and ethnic identity.” While the *ume kbubu* represents indigenous identity, modern houses or healthy ‘rumah sehat’ are associated with prosperity, public image, social status and external interventions imposed by the state. However, as Windi and Whittaker (2012) argue, this modernity does not provide the “warmth, security and emotional nurturance” that the Dawan perceive as necessary for optimum health and to protect them from disease. Indeed, warmth is a key factor identified by Nugrahaeni & Suwantara (2012). Their scientific study finds that the architectural design of the *ume kbubu* significantly improves thermal performance retaining heat and temperatures of approximately 24.6 degrees Celsius in the rainy season and 27.6 degrees in the dry season.

Papers from local researchers from Timor should also be considered. One example is a research paper from the local Universitas Kristen Artha Wacana (Kause, 2013). This paper demonstrates the important contributions of local researchers as these people often hold a greater contextual knowledge including an understanding of local cultural and historical factors. The paper from UKAW defines the *ume kbubu* as part of a family’s home. This means that only people who possess blood ties are permitted free entry and exit of the *ume kbubu*. Thus local researchers identify the *ume kbubu* as an important possession not only of the household and family but also of the Dawan people and culture itself.

There is a clear diversity of perspectives within the literature and policy areas surrounding these maternal and neonatal health issues. Some have even likened this diversity of perspectives to a clash of ideas. McWilliam (1999) suggests that the relationship between indigenous peoples of West Timor and the Indonesian state reflects an ongoing tension inherent across Indonesia between local ‘traditional practice’ and authority and the ‘modern’ ideological prescriptions and administrative powers of the national government. As a result, this paper contributes to a wider discourse surrounding debates about the devaluing of local traditions and imposition of centralized policies within a discourse of public health interventions.

**Development gaps**

This next section discusses three main contextual factors related to the local issues of maternal and neonatal health: firstly the development gaps within Indonesia, secondly the environmental health conditions in South Central Timor and thirdly, a deeper investigation of the traditional use of the *ume kbubu*.
Within Indonesia there are dramatic development and health service gaps. This disparity can be found between various cores and peripheries. Commonly highlighted in the wider literature is a clear urban-rural gap, see studies from Makowiecka K (2008), Erlyana E (2011). The gap between the rich and poor is widened through vast income disparities which are seen throughout Indonesia; see Budi Utomo (2011) and Suryadarma D (2006). Perhaps most troubling is the vast inter-provincial development gap (UNICEF 2012).

Across the 33 provinces of Indonesia the province of NTT generally faces more difficult public health conditions (UNICEF, 2012): lower government revenues, higher rates of poverty, and poor health indicators (AIPMNH, 2008). There are also a range of health system constraints such as dysfunctional referral systems, poor quality and low numbers of key health workforce, as well as poor governance, weak accountability to clients and communities and a range of other problems (AIPMNH, 2008). These difficult conditions are further exacerbated by complicated environmental factors such as droughts, floods and environmental health degradation. The cumulative impact of these factors further adds to the prevailing disadvantage, structural inequality and stigma which separate the diverse provinces of Eastern Indonesia from core Indonesia.

In a context of such diversity and inequality it becomes increasingly difficult to implement wide-scale government health interventions. Nationwide studies, blanket policies and interventions are unlikely to be able to pay adequate attention to diverse local historical, cultural, socio-economic and environmental conditions. In order for programs to be more effective a clear understanding of the local context is needed.

As a result, this study examines the specific context of Timor Tengah Selatan (TTS). Particular focus is given to the district’s unique conditions in terms of geography, local public health systems, social cultural customs and beliefs, environmental health conditions and the resulting government programs and interventions.

Environmental health

In essence, environmental health refers to all the physical, chemical and biological factors of our environment that have the potential to influence health and behavior. According to the World Health Organisation (WHO), at its broadest, environmental health addresses: -

all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours. It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments. This definition excludes behaviour not related to environment, as well as behaviour related to the social and cultural environment, and genetics. (WHO, 2013)

This study investigated five key factors of environmental health and protection found by local researchers to be most relevant to the context of NTT. Effendi (2013) lists five key factors as crucial to guarding the environmental health of settlements: access to clean water, adequate
draining, sanitation, management of rubbish, roads and paving and access to health facilities, markets and district capitals.

**Environmental health in South Central Timor.**

Timor Tenggah Selatan (TTS), or *South Central Timor*, is composed of 394,000 hectares of land making it the third largest district in NTT (BPS *NTT, 2012/2013*). The district is also composed of 32 *Kecamatan* or sub-districts and 278 *kelurahan* or village subunits (BPS *NTT, 2012/2013*).

Located in the South-Central hills, the capital city of TTS, Soe and the surrounding area sits at an altitude of 900+ metres above sea level. As a result of its higher altitude (the 3rd highest in the province) the district of TTS experiences a cooler climate and greater volume of rainfall than most other parts of Timor. Because of its mountainous terrain, many of the sub-districts and villages in TTS are very remote and difficult to access. As a result, many of these villages must also face a range of challenges in accessing health services.

Not having access to trained medical staff has been proven to increase the risk of maternal and neonatal death. In 2012 TTS recorded 25 maternal deaths (14.53% of the entire province), the highest number recorded in NTT (*NTT 2012*). In the breakdown of these figures, 16 of these deaths were attributed to loss of blood and hemorrhaging (BPS NTT, 2013, pp. 152-155). A further three deaths were caused by hypertension during pregnancy and four more were linked to infection (BPS NTT, 2013, pp. 152-155). These conditions may have also been interrelated and mothers may have experienced two or more of these illnesses as a cause of death.
Of all the 21 districts of Nusa Tenggara Timur (NTT) Province, in 2012 TTS recorded 32.55% (the 3rd highest proportion) of mothers entering labour without a trained health practitioner (such as a doctor or midwife). This was well above the province’s average of 28.29% (BPS NTT, 2013, pp. 152-155). These results may be attributed to the hilly, rural and remote nature of the district. There may also be a range of other contributing factors such as the cultural and traditional mystical belief of the Dawan people. One such belief lends credence to the *ibu dukun*, who act as faith healers and midwives.

Within *Dawan* tradition the *dukun* act as a traditional healer and midwife. With substantial experience in delivering babies and expertise in traditional natural medicine, the *dukun* has traditionally been a medical authority. Communities have turned to these *dukun* to assist in the delivery of newborn babies even until more recent times. In situations where communities have greater difficulty in accessing health facilities and medical staff, the *dukun* are more likely to be consulted with. In recent years with various government interventions, consultation with the *dukun* has steadily been limited. However, reliance on *dukun* remains the most viable option in situations where no other options or health workers are available. The lack of trained medical workers remains a problem in TTS. Local village level health clinics are not always staffed and when they are their staff are not always adequately trained.

Interestingly, interviews with local village communities highlighted a concerning number of community members who held more faith in the *dukun* than in some of the medical staff in village health clinics. According to various correspondents, often midwives, nurses and directors, despite having completed their education and training may often lack real practical experience, leading to complications and even death.

Figure 2 below tabulates data relating to maternal and neonatal death through 2010, 2011 and 2012 (BPS NTT, 2013, pp. 152-155). Interestingly, the number of maternal deaths has dropped since 2010 (46 deaths) to 25 deaths in 2012. However, this has coincided with an increase in neonatal deaths from 75 in 2010 to 93 in 2012. The proportion of neonatal deaths attributed to ‘other’ causes has been disturbingly high. This verifies the need for further investigation and more detailed explanation of the causes of neonatal deaths.
Figure 2. Maternal and neonatal deaths and ‘other causes’. (BPS NTT, 2013, pp. 152-155)

<table>
<thead>
<tr>
<th>Year</th>
<th>Maternal Deaths</th>
<th>Neonatal Deaths</th>
<th>Proportion of ‘other’ causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>25</td>
<td>93</td>
<td>(15/93)=16.13%</td>
</tr>
<tr>
<td>2011</td>
<td>23</td>
<td>58</td>
<td>(27/58)=46.55%</td>
</tr>
<tr>
<td>2010</td>
<td>46</td>
<td>75</td>
<td>(26/75)=34.67%</td>
</tr>
</tbody>
</table>

Amidst dire health conditions, clear and detailed information about the health conditions in the most difficult and remote areas becomes increasingly important. This study intends to shed light on the concerning information gaps relating to ‘other causes’. Shedding light on these unknowns is crucial in providing a clear understanding of the root causes of maternal and neonatal health thereby illuminating a direction or path and the measures needed to address these concerns.

The high number of maternal and neonatal deaths as seen in TTS in 2012, may be linked to a number of complex conditions and factors. This paper explores a number of environmental health factors as well as the social-cultural context of these villages.

The ume kbubu

This study of the environmental health of village communities in TTS would not be complete without a clear understanding of the role of the ume kbubu. An examination of the role of the ume kbubu as a resting place for mothers and their newborn babies is especially relevant to maternal and neonatal health conditions.

The ume kbubu remains an iconic representation of the traditional culture of the Dawan people of Central Timor. According to Situmeang (2013), the ume kbubu is used as “a round kitchen” (Situmeang, 2013). The bee-hive shaped huts are commonly found adjacent to village households of TTS. Some of the villages further away from the core (Soe city) still use the ume kbubu as resting places for mothers and newborn babies through the process of warming or panggang ‘roast’ through the fire and insulation within the ume kbubu. However, this tradition is becoming increasingly difficult to find.

Environmental health and the process of panggang in the ume kbubu are largely passed on through spoken word from generation to generation. In terms of environmental health conditions—the dust, ash, smoke and extreme heat are potential environmental health threats. Also there have been reported cases where flames have caused the bed to catch fire (Mr. Mella 2013 pers. Comm). These risks are conferred by the multifunctional nature of the ume kbubu as a resting place, granary and kitchen. As a kitchen and store room for food, the ume kbubu is more closely associated with the traditional gender role of women. The ume kbubu has traditionally been a place of rest for mothers during childbirth. As mentioned, this has raised a number of questions regarding the delicate balance between modern health standards and respect for tradition.
The process of panggang has been of particular concern. The custom is based on an ancient belief. In essence, panggang is all about providing a place of warmth for mothers and their newborn children while they recover from childbirth. As a result, most of those who practice panggang are located in the colder, more mountainous parts of TTS. For the purpose of warmth, the ume kbubu provides an ideal resting place as the thick walls insulate against the cold mountain winds (Nugrahaeni & Suwantara, 2012). Without any windows or other forms of ventilation, the warmth of the fireplace is retained within the ume kbubu.

The process of panggang begins after giving birth. Within this process, the mother and her child should remain in the ume kbubu on top of the woven bed or resting place for four days and four nights (Mr. Mella 2013 pers. Comm). During this time the mother and child are forbidden from leaving the resting place. The rules are strict and even placing ones feet upon the ground can be seen in breach of these rules.

Panggang also involves a small fire and boiling water to be placed underneath the woven resting place of the mother. Hot water and steam are applied to the mother’s body. The water is prepared by boiling the water with some medicinal herbs. The water is then applied by using a cloth dipped into the hot water and then pressed to the mother’s body. In local languages this process is referred to as tas or tatobi (Mr. Mella 2013 pers. Comm). It is believed that the medicinal and therapeutic properties of this process help to cleanse the body of unclean blood and other residues left over from the process of child birth. Through bathing in this hot water in the ume kbubu, the additional warmth is also believed to help the mothers regain their strength and recover more quickly. The mothers and children must remain on the woven resting places inside of the ume kbubu. This belief and custom has been most firmly defended by the dukun. Some mothers also spoke of elders, in particular their mother in laws as who use their position of power in the family as to pressure them to follow this tradition.

Throughout Timor, the ume kbubu otherwise known as Rumah Bulat (Round House) is relatively standardized in terms of structure (Nubatonis, 2013). The ume kbubu have been built practically for warmth. Naturally, these structures can only be found in the cooler parts of Timor. To retain heat from small indoor wood-fires and prevent cold winds and rain from entering, the ume kbubu are built without windows or other forms of ventilation. The ume kbubu usually has a one metre high doorway. The Dawan people prepare food inside of the house using wood as fuel for their fires. This often creates large amounts of smoke which has contributed to the government’s concerns and motivations to build new houses for the Dawan people. Some of the images below illustrate the appearance and contents of the ume kbubu. Appendix 1-2 also provide further imagery and insights relating to the ume kbubu.
Figure 3: The Ume kbubu – a rendered illustration

Sketches based on measurements and observation (Metherall 2013)

Figure 4: Inside the ume kbubu

Sketches based on measurements and observation (Metherall 2013)

The top left image shows the material makeup of the ume kbubu. A one metre high stone wall provides the foundation of the ume kbubu. On top of this the structure utilizes bundles of grass tied together with a rope like thread. Corn, legumes, seeds and other food stores are kept inside the ume kbubu. Corn can be tied to the ceiling or stored in the attic. A ladder allows the mother to climb up to the attic to retrieve more of the food stores. The image highlights the primary function of the ume kbubu as a granary and kitchen. The top right image shows the environmental health risks associated with the Ume kbubu. Smoke, ash
and dust were categorized as respiratory threats. The fire itself, and extreme heat from the \textit{panggang} process also constitutes an environmental health hazard.

The bottom image illustrates a floor plan of the \textit{ume kbubu}: the stone wall, the firewood storage, the fireplace, resting place and second fire for \textit{panggang}.

\textbf{Research method}

The method utilized in this study involved collection of data through interviews at the District level Centre of Health Intelligence, \textit{Dinas Kesehatan TTS}. This process was followed by interviews and the facilitation of discussion to fill in participatory matrices forms with midwife staff and local community members regarding their experiences with the factors of environmental health, the key factors affecting neonatal and maternal health and the traditional use of the \textit{ume kbubu}. This data was sorted into matrices (see appendix figures 5 and 6) to form a foundation of participatory statistics (Holland, 2013).

After the foundational data was collected over a couple of days, the next step was to visit some of the village case studies. Nusa, Supul and Boti were selected for the purpose of providing illustrative cases of villages with varying proximities to the core of TTS. Nusa, the first village chosen was the closest to Soe; Supul was a medium distance to Soe but still easily connected to a main road. Finally, Boti was chosen as an indicative example of a more remote village. More importantly, Boti is a village renowned for its strong adherence to traditional customs or \textit{adat}. As a result, the use of \textit{panggang} and the \textit{ume kbubu} are still widespread and the effects of expansive modernization have been limited by remoteness.

Within these villages a mixture of participatory matrices and mapping was used in small focus groups. Semi-structured interviews and focus groups served as the main method of gathering information. Conversational approaches were supplemented with questionnaire like structures.

In the field, perspectives and experience were gathered from three expert staff from the Dinas Kesehatan TTS. Two midwife staff working in local village health clinics were also interviewed. Six mothers who had experienced giving birth in the \textit{ume kbubu} as well as the process of \textit{Panggang}. Perspectives from a small farmers group were also gathered from two members who were both born in the \textit{ume kbubu}. Small focus groups in each of the three villages provided additional insights into environmental health conditions into these villages. Through comparative study, wider conclusions indicative of the wider TTS were also drawn.

Limitations to this study’s method include the small size of the sample which was limited to just 3 villages. In particular, the sample of 6 mothers who participated in semi-structured interviews and the 3 small focus groups in each of the three villages may not provide enough participatory statistics to be representative of each of these villages individually. Furthermore, the results from the limited volume of respondents in these samples may not provide enough data to be sufficient for generalization across wider TTS. Consequently, the results of this paper should not be taken to generalize the conditions across the vast and complex district of South Central Timor. Instead, this research is more
useful as a means of shedding light on people’s experiences and attitudes towards more general environmental health conditions as well as the use of the *ume kbubu*.

The subjectivity of ideal health practice is also worth noting. The participants interviewed in the three sample villages may have differing perceptions of concepts such as environmental health. This is particularly the case in relation to how village communities hold diverse scales of perception in gauging their own physical condition and wellbeing, especially when compared to perceptions in urban populations. Indeed, the study also highlights that ‘good health’ is an inherently subjective idea. This is also the case in relation to traditional belief systems vs. modern medicine and environmental health best practice.

**Results**

Community focus discussion groups across the three sample villages all identified access to clean water as the most important factor in relation to public health. Adequate draining was commonly ranked second most important, largely due to the environmental health impacts of floods and contamination of water sources. In Nusa Village, access to water was perceived as the most important criterion, with draining as the second most. Rubbish management was third and sanitation and roads and access were not seen to be as important.

In Supul Village access to water was also perceived as the most important criterion. However, roads, paving and access received almost as high a score through these participatory statistics. Draining received the third highest ranking. The community stated that even with access to clean water, inadequate draining means it will only be a matter of time before the water becomes contaminated by waste or the nearby manganese mine. Supul village has already begun building separate water taps and sinks adjacent to each house with positive effect of reducing the risk and spread of contamination. However, this process of building taps and sinks has not yet been socialized to the furthest households, while sanitation and rubbish were fourth and fifth, respectively. The interesting variables in Supul village include the large manganese mine and large lake located to either side of the watershed ridge. See village maps for further information (appendices fig.7, 8, 9).

In Boti Village access to water was perceived as the most important criterion. Drainage was perceived as the second most important. In order to prevent flooding, the people of Boti use stone fence and dam structures. Sanitation was the third most important since it could often be worsened through flooding of toilets and waste areas. Rubbish management was not perceived to be important at all. Correspondents in Boti stated this was because they guard their environment and have little to no need for rubbish which use plastics or papers. As a result, the criterion for rubbish management was left blank.

Semi-structured interviews were also conducted with people who had experienced *panggang* in the past. The sample included interviews with 2 women (mothers) from each of the 3 sample villages. The results showed that almost all the women had experienced *panggang* in the past. Whether the *panggang* is ‘strict’ (follows the rules of the *dukun*), ‘not
strict’ more nominal following of the practice of panggang; this usually involves just sitting in the ume kbubu for warmth rather than panggang strictly in accordance with the instruction of the dukun. It was found that age usually plays an important role since women over the age of 30-40 (born in the 70s – 80s) would have had their children during a time when panggang and childbirth in the ume kbubu was not yet considered a health hazard. As a result, women of an older age were more often likely to have practiced strict panggang when compared to women below 35.

The women who were interviewed in Boti still continue to practice panggang in accordance with traditional adat rules. These were the only women who would continue the practice of panggang in the future. The other women would not continue this practice since they fear having to pay penalties. This deterrent mechanism was implemented between 2009 and 2013. The results showed that most women would not continue the practice of panggang even if they had practiced it in the last 5-10 years. This demonstrates that the process of panggang and the tradition of the ume kbubu is now at a stage of transition. Recent government interventions have restricted the use of panggang and other traditional medicines. Through some of the interviews it was found that some mothers had experienced discomfort and pain when they took both modern and traditional medicine (papaya leaves and other salves). Some community members stated that the mixing of traditional and modern medicines has been found to react badly. As a result, mothers must often make a choice: modern or traditional. It is very difficult to incorporate both.

From surveys, focus groups and in-depth interviews no substantial causative link could be drawn connecting use of the ume kbubu and the incidence of maternal and neonatal death. No link could be drawn between the environmental health hazards and long-term negative effects on health. A range of environmental health hazards were identified inside the ume kbubu and through the process of panggang: smoke, ash, dust, fire, and other environmental health hazards. Information collected through the interviews, focus groups and other experiences involving mothers and other community members yielded a mixture of different results. Some of the interview subjects had also been born in ume kbubu and had experienced panggang as babies. Participants were unable to draw on examples of people who had experienced long-term negative health, respiratory or other effects from these traditional processes. Three mothers even spoke of how they felt better through the process of panggang as it helped them quickly regain their strength after birth. The other three mothers interviewed, said that after comparing both modern and traditional medicine and child birth processes they would prefer to use modern treatment, injections, and medicine if they were given the choice again.

One interesting theme which arose from discussions with some local community members in Nusa village was the idea that modernization has actually led to an increase in the rate of illnesses in these villages. When reflecting on their childhoods, the communities of Nusa spoke of a time when food and medicine was much simpler and more natural. No chemicals were used in eating, cooking, cleaning or in the development of agriculture and
livestock. According to these communities, people were stronger and lived longer back in the old days.

There have been a range of advances in medical technology, the revolution of maternal and neonatal health as well as the reformation of health clinics and a plethora of other government programs. Within this context there has been not only an increase in medical staff and research but also an increase in the number of diagnoses of illnesses. These community perceptsives raised the idea of a potential risk of paranoia contributing to increased diagnoses.

‘Other’ emergent causes of maternal and neonatal mortality

Through discussions with the focus groups, local village health clinic workers, and Dinas Kesehatan expert staff as well as various other community a number of ‘other’ potential causes of maternal and neonatal mortality were identified. These factors included transportation, rural isolation and difficult road conditions. Such factors present obstacles for mothers in labour from accessing adequate health services and safe health facilities in time. Ambulances, cars and sometimes motorbikes cannot always access the most distant and remote village households. This situation may be worsened by poor and slow decision making, lack of awareness of good practice in assisting expectant mothers, slow decision making and poor decisions which may put these mothers at further risk.

Even if these mothers are able to make the often long and arduous journey to a health care facility. Medical health staff are not always guaranteed to be available at these facilities. Well trained medical health staff may be even more difficult to come across. While inexperience and the rates of malpractice have not been studied in this context, these are factors which should not be neglected as possible causes of maternal and neonatal death. This was an issue that was largely dependent on geographic factors.

*Figure 5: Core and Peripheral Villages:*

<table>
<thead>
<tr>
<th></th>
<th>Core villages (Nusa and Supul)</th>
<th>Peripheral Villages (Boti)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance from main city</td>
<td>Minimal</td>
<td>Relatively far</td>
</tr>
<tr>
<td>Distance from main roads</td>
<td>Minimal</td>
<td>Relatively far</td>
</tr>
<tr>
<td>Environmental Health</td>
<td>Protected through modern</td>
<td>Protected through traditional</td>
</tr>
<tr>
<td>Conditions</td>
<td>practices</td>
<td>practices</td>
</tr>
<tr>
<td><em>Use of Ume kububu</em> (panggang)</td>
<td>Limited</td>
<td>Common</td>
</tr>
<tr>
<td>Use of modern medicines</td>
<td>Common</td>
<td>Limited</td>
</tr>
<tr>
<td>Economy</td>
<td>Market dependent economies</td>
<td>Subsistence and independent economies</td>
</tr>
</tbody>
</table>
In terms of the gap identified between these various villages, a clear distinction could be made between “core villages” and “peripheral villages”. This table presents a useful conceptualization of this gap between villages. This gap is not always a negative one. Some conditions in peripheral villages may even be preferable to conditions in the more core villages: for example, conditions in rubbish management and drainage. However, these conditions were found to vary.

*Figure 6: Distance between the core and periphery – map of TTS villages in relation to the City of Soe:*

This figure illustrates the distance between Soe, Nusa, Supul and Boti. Through the study, a pattern was found in which the villages further from the core city were considered more traditional and less influenced by both modernization and often also less influenced by government policies.

In accordance with the mandate of the National Constitution of the Republic of Indonesia, the government has introduced a number of programs with the stated purpose of providing quality health services to all of its citizens. Consequently, over the past four decades the Indonesian health care system has rapidly expanded (Utomo, 2011). With a large number of government programs with multiple purposes: for community welfare, political gain and standardization for unification of the diverse archipelago; a table can be useful in displaying these programs chronologically. It is useful to analyze these programs in sequence and their progress overall rather than analyzing them disjointedly and individually (see appendix 4.1).

It is also important to recognize the context of these various government interventions. Most of these programs have taken place within the *Revolusi Kesehatan Ibu*
dan Anak or the Revolution in Maternal and Neonatal Health, as well as the transformation of bureaucracy and reformation of health clinics in Indonesia (Pandie 2009). Various case studies indicate that even in the light of the Revolution of Maternal and Child Health, conditions remain difficult: See Dopo (2012), Lengo (2011).

In the wider context these programs have been implemented amidst a backdrop of the global development agenda – the Millenium Development Goals (MDGs). Given the wider context, it becomes clear through the observations at the village level, that TTS is now experiencing a transitional phase. The government’s policies and programs have imposed a modernization of health practices over these villages. As a result, mothers who were giving birth in ume kbubu 20-30 years ago are now giving birth in hospitals. Mothers following the strict dukun rules of panggang religiously 5-10 years ago now refer much less frequently to dukun and only use the ume kbubu nominally as place to stay warm.

Conclusion

Through the investigation into environmental health conditions in Timor Tengah Selatan, the ume kbubu and maternal and neonatal health, a number of conclusions were drawn. There is a clear development gap between the villages more closely linked to the main roads and the core of TTS and those villages in much more rural and remote areas. Other villages which live by and protect their traditional customs also display vastly different use of health facilities and importantly, different behaviour. One of the key differences between these two different kinds of villages is the use of the ume kbubu and the following of adat customs. This was clearly seen though comparison of the core and peripheral villages. Interestingly, no link was drawn between the use of the ume kbubu for panggang and community perceptions of causation with maternal and neonatal death or long-term negative health impacts. Instead, a number of other environmental health concerns and causes were linked to the category of ‘other’ causes of maternal and neonatal mortality. While this particular participatory research sample did not identify causal links between the processes of panggang and maternal and neonatal health risks, it is important to note other empirical studies might yield more definitive results. As a result, the authors recommend a number of future studies to be dedicated towards the grey area of ‘other’ causes of maternal and neonatal mortality in TTS and NTT more widely. This might involve a further more detailed investigation of environmental health conditions and the use of the ume kbubu in the more peripheral villages is also recommended. In particular, an in-depth empirical clinical study of panggang and both its short and long-term effects on newborn children, their mothers and long-term respiratory and neonatal development would be beneficial.

The authors recommend environmental health interventions and policy which are responsive to local feedback from communities who are able to identify their own local

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1 In particular, Lengo’s study of the District of West Manggarai in Flores
environmental health priorities. A policy response to the use of *panggan* processes must balance both health awareness information interventions from trained public health service providers alongside an awareness and appreciation of the cultural values and importance of the ume kbubu.

**Reference**


Budiyono, M. (2004). The correlation of physical factors of the traditional house of Dawan tribe and respiratory acute infection (ISPA) on babies at Oebesi and Noenbesi villages, North Mollo subdistrict, South Center Timor, East Nusa Tenggara province. *Journal of Environmental Health in Indonesia*, 3 (1), 37-39


Erlyana E, K. K., Glenn M (2011). "Expanding health insurance to increase health care utilization: will it have different effects in rural vs urban areas?" *Health Policy* 100(2-3): 273-281.


Kause, O. (2013). *Studi Tentang Pengkeramatan Batu Naetapan dan Dampaknya Bagi Masyarakat Desa Tunua, Kabupaten Timor Tengah Selatan* [Study about the ]

http://repository.uksw.edu/bitstream/123456789/4052/1/T2_752012011_Judul.pdf


Appendices

Appendix 1.1

Dimensions of the ume kbubu

In terms of materials, the ume kbubu commonly requires around 2.0819 cubic metres of prepared wood\(^2\) [S. Agung Sri Raharjo 2010]. A survey conducted by the Indonesian Ministry of Forestry in 2010 explored local community preferences for different kinds of trees/wood to be planted and harvested as timber [S. Agung Sri Raharjo, 2010]. The results show that local communities mostly use teak wood. The most desired building material is mahogany, with teak wood as a second choice. This survey provides insights, not only of local communities’ preferences for building materials but also of their various structural preferences.

![Sketches based on measurements and observation (Metherall 2013)](image)

As the renderings illustrate, the width of the entrance face of an average ume kbubu is around 4.8-5 metres with the doorway being around 0.7 metres and 1 metre in height. The length of the average ume kbubu is around 5.6-6 metres. The height of the ume kbubu is around 3.8-4 metres.

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\(^2\) Prepared wood* kayu pertukangan can be understood as timber or wood which has already been sawn, treated and ready to be used as a building material.
Appendix 1.2

An example of a royal ume kbubu

Timor was traditionally made up of a number of kingdoms: Mella, Nope, Baunaek (Mr. Bees 2014 pers. Comm). The kingdom of Nope was supported by four fiefdoms or supportive kings: (Bell, Faot, Betty and Nubatonis). The ume kbubu below belongs to the descendants of the Bell fiefdom (Mr. Mella 2013 pers. Comm). It is substantially larger than the standard ume kbubu.

Appendix 1.3

Standard ume kbubu:

The researcher was fortunate enough to have the opportunity to spend a number of nights in the ume kbubu located in Supul Village south of Supul Lake. This experience allowed for the chance to experience the perceived environmental health hazards first hand.

Through limited experience living in the ume kbubu, it was found that levels of dust and ash varied depending on the use of the kitchen. The direction of the smoke always rose to the attic unless there was a pot on the fire. As a result, for those sleeping or receiving panggang, the smoke rising high above them would have a variable effect depending on whether a pot was put on the fire and the resultant direction of the smoke. However, it may be more difficult to judge the short and long term impacts of this smoke, dust and ash on the lungs of a newborn and rapidly developing baby or a mother in the process of recovery after childbirth.
Appendix 2.1

Participatory matrices

For the purpose of this study, participatory matrices provide a tabulation of the environmental health factors alongside criteria such as perceived importance, urgency, and viability.

**Nusa village environmental health factors**

<table>
<thead>
<tr>
<th>Nusa Focus Group</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Average</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to clean water</td>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>4.67</td>
<td>Water remains the most important factor since it is both important and urgent. It is also a viable option for a village project proposal.</td>
</tr>
<tr>
<td>Draining</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
<td>Draining was ranked as the second most important environmental health factor by the community of Nusa. It was not overly urgent at this stage due to the fact that Nusa is located in the mountains and rarely experiences floods.</td>
</tr>
<tr>
<td>Sanitation (toilets)</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>1.67</td>
<td>Toilets were recognized as an important factor. However, most houses already possessed toilets.</td>
</tr>
<tr>
<td>Rubbish management</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>2.33</td>
<td>Rubbish management was an important issue. There are currently no specially allocated rubbish disposal areas. Most rubbish is simply burned adjacent to one’s own household. Other rubbish is thrown aside impacting environmental health conditions.</td>
</tr>
<tr>
<td>Paving and access</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1.67</td>
<td>Paving and other infrastructure was not categorized as very important nor very urgent. This may be related to Nusa village being located relatively close to the core of TTS.</td>
</tr>
<tr>
<td>Others: (identified by local community members)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment and poverty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A lack of working opportunities and poverty were identified as key problems. The low income of locals in Nusa Village would often prevent them from gaining access to health care and other costly services.</td>
</tr>
</tbody>
</table>
Appendix 2.2

*Nusa village housing*

<table>
<thead>
<tr>
<th>Nusa</th>
<th>Proportion</th>
<th>Kitchen</th>
<th>Child-birth / Panggang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-permanent and permanent</td>
<td>Almost all family units have a permanent or semi-permanent home</td>
<td>Some houses have internal kitchens</td>
<td>Over the past few decades, <em>panggang</em> has become increasingly rare in Nusa. <em>Panggang</em> is still well remembered but rarely continued.</td>
</tr>
<tr>
<td>housing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ume kbubu</td>
<td>Around half of all houses still have an Ume kbubu</td>
<td><em>Ume kbubu</em> are still used as a kitchen.</td>
<td></td>
</tr>
</tbody>
</table>

Appendix 2.3

*Supul village environmental health factors*

<table>
<thead>
<tr>
<th>Supul Focus Group</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Average</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to clean water</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td>4.43</td>
<td>Water remains the most important factor since it is both important and urgent. It is also a viable option for a village project proposal.</td>
</tr>
<tr>
<td>Draining</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
<td>3.29</td>
<td>Draining was ranked as the third most important environmental health factor by the community. The villagers said that even with access to clean water, if there is inadequate draining it will only be a matter of time before the water becomes contaminated. Supul village has already begun building separate water tap and sinks adjacent to each house with positive effect of reducing the risk and spread of contamination. However, this process of building taps and sinks has not yet been socialized to the furthest househoulds.</td>
</tr>
<tr>
<td>Sanitation (toilets)</td>
<td></td>
<td>2</td>
<td></td>
<td>1</td>
<td>1</td>
<td>2.71</td>
<td>Toilets and sanitation were recognized as an important and urgent issue. However, at this stage most of the houses in the village already had a permanent or semi-permanent toilet structure. Furthermore this was perceived as an individual rather than a communal issue.</td>
</tr>
<tr>
<td>Rubbish management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2.57</td>
<td>While most thought that rubbish management was important. The majority also believed that this was an issue which could wait, it was not the most urgent. However, one community member believed it was very</td>
</tr>
</tbody>
</table>
important and this lead to an interesting debate within the focus group. In the end the group agreed that rubbish management was important but not the most urgent compared to the other factors. It was agreed that rubbish management should be brought up at the next village meeting.

| Paving and access | 1 | 1 | 4 | 1 | 4.14 | Paving and other infrastructure was the second most important, and the most viable of options. It was second to access to water in terms of urgency.

Others: (identified by local community members)

Lake

The lake was identified as a water source for the village. This could have a number of spill-over benefits if managed well. The villagers wanted to maximize the benefits brought by the lake in terms of a source of income (fisheries and tourism).

However, the lake was also identified as a place with a higher risk of spreading mosquito borne diseases.

Magnesium Mine

The magnesium mine behind Supul village is gargantuan. The exports of magnesium are a large source of economic growth for the villages.

However, recent studies have also shown the negative impacts of the magnesium mining on the environment and the community. Some examples include contamination of water sources and the blood and respiratory systems of the surrounding communities. The villagers also spoke about the risks regarding unsustainable mining, mud-slides and the resulting environmental degradation.

Appendix 2.4

Supul village housing

<table>
<thead>
<tr>
<th>Supul</th>
<th>Proportion</th>
<th>Kitchen</th>
<th>Child-birth / Panggang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-permanent and permanent housing</td>
<td>Almost all family units have a permanent or semi-permanent home</td>
<td>Some houses have internal kitchens</td>
<td>Over the past few decades, panggang has become increasingly rare in Supul. It is now difficult to find villagers who continue this tradition.</td>
</tr>
<tr>
<td>Ume kbubu</td>
<td>Almost all houses still have an Ume kbubu</td>
<td><em>Ume kbubu are still used as a kitchen.</em></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix 2.5

**Boti village environmental health factors**

<table>
<thead>
<tr>
<th>Boti Focus Group</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Average</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to clean water</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td>4.2</td>
<td>Water was deemed to be the most important by the focus group drawn from the community of Boti.</td>
</tr>
<tr>
<td>Draining</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>2.8</td>
<td>Draining was deemed important. In order to prevent flooding the people of Boti use stone fence and damn structures.</td>
</tr>
<tr>
<td>Sanitation (toilets)</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>1.8</td>
<td>Toilets are usually dug adjacent to houses. This has been the tradition of the Dawan people in past times and these conditions have been sufficient. Issues only occur in times of floods when these toilets are washed away which may present an environmental health hazard.</td>
</tr>
<tr>
<td>Rubbish management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The people in Boti guard their environment and have little to no need for rubbish such as plastics or papers. As a result, this criteria was left blank.</td>
</tr>
<tr>
<td>Paving and access</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>1.6</td>
<td>The need to participate in markets, buy goods from the city was limited by the geographic location. The people of Boti are largely self-sufficient without the need for modern infrastructure and paving.</td>
</tr>
</tbody>
</table>

### Appendix 2.6

**Boti village housing**

<table>
<thead>
<tr>
<th>Boti</th>
<th>Proportion</th>
<th>Kitchen</th>
<th>Child-birth / Panggang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-permanent and permanent housing</td>
<td>There are very few modern or permanent homes within the village of Boti</td>
<td>The small wooden houses sometimes have cooking pots.</td>
<td>Panggang remains common practice in Boti. The village remains one of the last to retain this particular traditional custom within this sample.</td>
</tr>
<tr>
<td>Ume kbubu</td>
<td>Almost all houses still make use of the Ume kbubu</td>
<td><em>Ume kbubu</em> are still widely used as a kitchen and granary.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2.7

Survey of mothers: Ume kbubu and panggangi

<table>
<thead>
<tr>
<th>Subject</th>
<th>Village</th>
<th>Age</th>
<th>Past panggang</th>
<th>Continued panggang</th>
<th>Observed negative impacts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother 1</td>
<td>Nusa</td>
<td>54</td>
<td>Y (strict)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Mother 2</td>
<td>Nusa</td>
<td>28</td>
<td>Y (not strict)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Mother 3</td>
<td>Supul</td>
<td>34</td>
<td>Y (not strict)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Mother 4</td>
<td>Supul</td>
<td>62</td>
<td>Y (strict)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Mother 5</td>
<td>Boti</td>
<td>32</td>
<td>Y (strict)</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Mother 6</td>
<td>Boti</td>
<td>36</td>
<td>Y (strict)</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

Appendix 3.1

Participatory Mapping

Participatory mapping provides a useful visualization of village conditions since it is based upon local knowledge. Perhaps even more important than the final product of participatory mapping is the process itself which has been shown to be a useful learning and reflection process (Holland, 2013). Participatory mapping also forms one of a number of methods within a wider movement towards participatory rural appraisal and participatory action research as championed by Chambers (1994) and Estrella, Gaventa et al. (1998).

Even more technocratic and technology dependent forms of mapping have begun to see the importance of community participation. Abbott (2000) highlights the importance of community participation in decision-making. Abbot believes that this also requires that technology adapt and become more accessible for communities. In particular, for GIS systems to be made capable of providing a degree of interactive planning with members of the community. The results of the participatory mapping can be seen in Fig 7, Fig 8 and Fig 9. Below.
Fig 7. Nusa Village:

Nusa presented a case of a village quite close to the core of TTS (Soe). Most of the basic environmental health needs had been met and villagers did not need to travel far to reach the core of Soe if the need arose. Mapping highlighted that wide-scale development programs like PNPM had also assisted in building additional public toilets near the market place.

Fig 8. Supul Village:

Supul presented a case of a village a moderate distance away from the core of TTS (Soe). The participatory matrices highlighted a number of the environmental health factors as important but urgency was found to be only within a mid-level category. The villagers identified the lake as both a positive and negative: a source of water but also as a potential source of mosquito borne diseases. According to community perspectives, the huge magnesium mining industry was identified as an environmental health threat since it had already been believed to contaminate water sources and impact the blood composition of locals.
Fig 9. Boti Village: Boti as a rural and remote case study presented some interesting environmental health results. There were a number of environmental health factors which were found to be no longer relevant to Boti village. Without any rubbish waste to become a source of environmental degradation, traditional draining and sanitation systems also substituted for the need for concrete box toilets and large man made piping systems. Due to geographic location and remoteness, the need for paving and roads was also found to no longer be necessary since these villages were more self-sufficient. These communities did not need to make frequent trips to the city.

Appendix 4.1

Policy

*Fig 10. Policy changes over time*

<table>
<thead>
<tr>
<th>Year</th>
<th>Name of Program</th>
<th>Purpose</th>
<th>Results (within the context of TTS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970s</td>
<td>Rumah Sehat “Healthy home”</td>
<td>To build permanent housing with adequate facilities to ensure standards of environmental health</td>
<td>Many village households are now of semi-permanent nature. There are still some traditional ‘dirt floor’ houses. However, they are steadily becoming more of a rarity. Now not as many people live in the traditional Ume kubu.</td>
</tr>
<tr>
<td>1997-2007</td>
<td>PPK / KDP “Sub-district development program”</td>
<td>Poverty alleviation – largely through conditional cash transfers with a focus towards infrastructure</td>
<td>Throughout the three waves of KDP, a large number of roads, bridges and other infrastructure was laid down throughout Indonesia. The KDP program perceived as a success was scaled up to 40,000 villages throughout Indonesia.</td>
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<tr>
<td>2004-2009</td>
<td>RPJMN</td>
<td>Plan for building a middle class in Indonesia: to raise the quality of health services, the human</td>
<td>The promotion of environmental health education within this program was also emphasized.</td>
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<tr>
<td>Period</td>
<td>Program Name</td>
<td>Description</td>
<td>Outcome</td>
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<tr>
<td>2007-2015</td>
<td>PNPM “The National Program for Community</td>
<td>A continuation of KDP. Continued focus towards physical infrastructure, however, with a greater commitment towards gender equality and an emphasis on community participation.</td>
<td>PNPM – continues until today. The primary program, PNPM-Mandiri has continued to focus on infrastructure as can be seen in TTS. However, there has been an increasing focus towards gender equality, and wider participation. The program continues to struggle with issues such as elite capture in reaching pro-poor targeting. PNPM has diversified into a number of programs with various focuses including rural, urban, sectoral focuses such as health and education and even regional focuses. The most common program in TTS is PNPM-Mandiri Rural which is largely geared towards the MDGs.</td>
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<td></td>
<td>Empowerment”</td>
<td>As a World Bank supported program, PNPM is closely oriented towards the MDGs.</td>
<td></td>
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<tr>
<td>2000-2010</td>
<td>Indonesia Sehat 2010 “Healthy Indonesia”</td>
<td>Indonesia Sehat or “Healthy Indonesia” was aimed towards increasing access to health service provision.</td>
<td>While some progress has been made in increasing access to basic health facilities and services in TTS. There are a number of areas were more work is needed.</td>
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<tr>
<td>2009-2011</td>
<td>Polindes “Birthing cottage”</td>
<td>Polindes was a policy used to prevent mothers from giving birth without going to a health facility. Those who did not follow this law would be fined.</td>
<td>The use of a threat (fine) was effective in reducing the number of mothers who would give birth outside of a health facility. Many families were afraid of having to pay the penalty for not following this law.</td>
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<td>2012+</td>
<td>Fines and negative penalties</td>
<td>The processes of Panggang and dukun are banned. Traditional medicine is discouraged.</td>
<td>Has reduced the use of traditional medicine and practices throughout most villages. There remain a few rare villages</td>
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which continue to defy invasive modernization.

Sources:
(Pandie, 2009)
(Onishi, 2008)
(Stokes, 2009)