
brick markets in west Sumatra after the 30 September 2009 earthquake



*an inter-agency assessment of issues
in brick supply & demand*

*16 –19 October 2009
Pariaman & Padang Districts - West Sumatra*

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table of contents

1. background	2
2. market analysis – methods & key questions	3
3. market analysis – brick manufacturing process	4
4. key findings – brick manufacturers	5
5. key findings – brick prices & financing	5
6. key findings – brick demand	6
7. key findings – gender issues	6
8. possible reconstruction scenarios	7
9. recommendations	8
10. acknowledgements	9

background

On 30 September 2009, a 7.6 magnitude earthquake struck the coast of West Sumatra. The Indonesia Ministry of Health reported over 1100 deaths and 3600 injuries as a result of collapsing buildings and landslides in 7 districts.¹ Over 200,000 houses were destroyed or severely damaged by the earthquake, with the greatest damages reported in the affected Padang Pariaman district, where over 96% of the housing stock is in need of replacement or repair.²

A rapid assessment of the housing damages in the first weeks after the earthquake identified three (3) main types of building materials and construction techniques used for housing construction in the region: brick-based masonry (with or without concrete columns); timber; and stone with mortar.³ Although inadequate attention to the structural limitations of brick based masonry caused many of these buildings to collapse, bricks remain the preferred building material for residential construction in West Sumatra.

Experience from previous disasters in Aceh (2005) and Yogyakarta (2006) has shown that the demand for bricks for housing reconstruction quickly outstrips the available supply. This often leads to a dramatic increase in the price of bricks in local markets, and/or periodic supply shortages that delay reconstruction progress. To help inform the regional / national / international assistance for housing reconstruction in West Sumatra, a rapid survey of the impact of the earthquake on the supply and demand of locally produced bricks took place on 16 – 19 October 2009. This report summarizes the results of this market and household based survey, and looks at three potential reconstruction scenarios that may impact on the local supply of bricks. Recommendations on actions to support the rehabilitation of regional brick production with a pro-poor focus conclude this report.

¹ WHO Emergency Situation Report # 13, 19 October 2009

² OCHA Situation Report # 15, 20 October 2009

³ CARE International Rapid Shelter Assessment 05-12 October 2009

market analysis: methods and key questions

This research was conducted using the application of a newly developed market analysis tool known as EMMA – Emergency Market Mapping and Analysis.⁴ EMMA uses background research, interviews, and graphic representations of market systems to help inform humanitarian response options. In EMMA terminology, a market system is defined as “a web of people, businesses, structures and rules that take part in producing, trading and consuming a product or service.”⁵

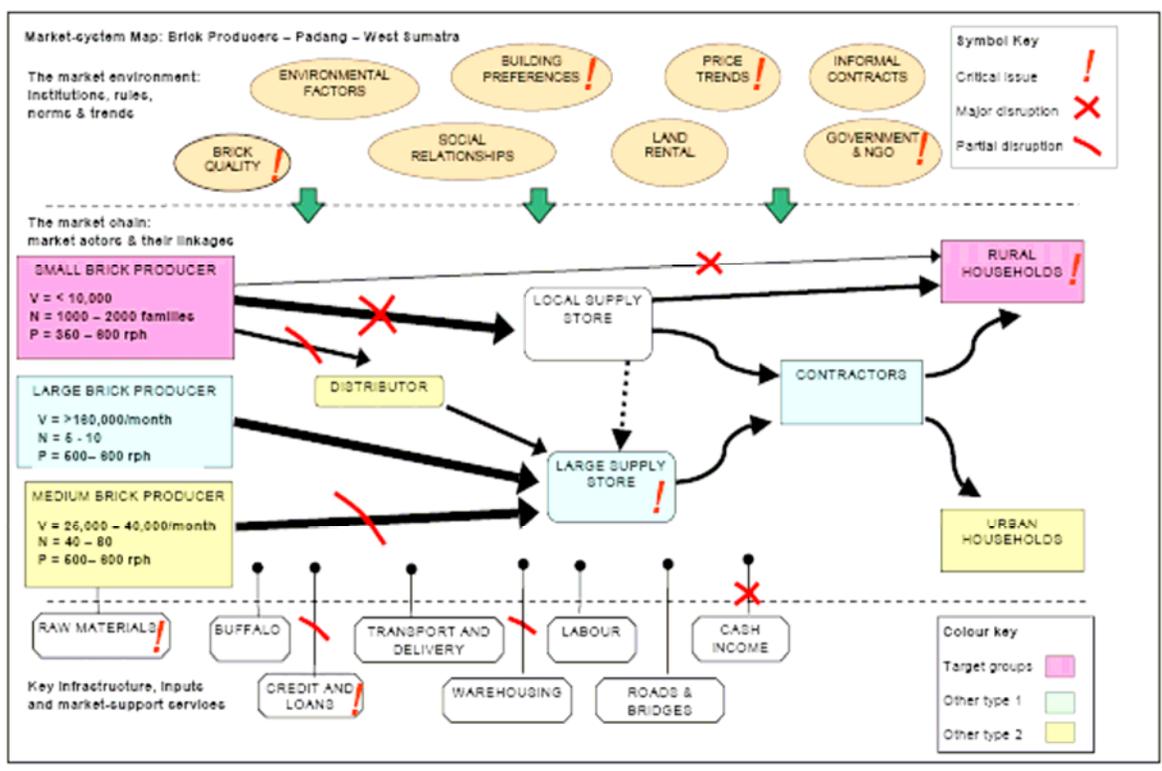


Figure 1 : Brick Market Chain Map - post 30 SEP 2009 Earthquake

Surveys were conducted on 17- 18 October, 2009 with 26 brick manufacturers (small, medium, and large scale); 6 distributors; and 31 households in Padang Pariaman and Padang districts. Although different questionnaires were used with each group, the two key analytical questions guiding all interviews were:

1. What was the impact of the 30 September earthquake on the local production and distribution of earth bricks?
2. What are three (3) possible reconstruction scenarios involving bricks in earthquake affected areas of West Sumatra?

⁴ For more information on EMMA, see <http://dgroups.org/dfid/emma> or <http://www.emma-toolkit.info>

⁵ p5, *Introduction and Overview of the EMMA Toolkit*

market analysis: brick manufacturing process

Brick making in West Sumatra is a labour intensive operation involving 5 steps:

1. mixing: Clay, sand and water are mixed together in open pits by foot, shovels, or draft animals (water buffalos). Some of the larger brick manufacturers use mechanical (manual or electric) mixers. Most of the brick manufacturers in West Sumatra source their clay and sand from the immediate vicinity, with many of the smaller operations excavating the raw materials from hillside slopes behind their houses and brick yards. Men are typically hired for the mixing process.

2. shaping: The wet material is then compressed manually and shaped in wooden frames by labourers. Single or multiple (4 – 6 bricks) frames are used, with the excess clay mixture removed by wire bows. Brick sizes vary according to manufacturing location, and range from 4 cm (depth) by 9 cm (height) by 15 cm (length), to 6.2cm (d) X 10.5cm (h) to 24cm (l). While women are predominantly involved in brick shaping in the small - scale brick operations, men are also involved, especially in the larger operations. On average, a skilled labourer can produce 1000 – 1500 bricks per day.

3. air drying: The wet brick is then flipped from their frames onto small boards, and then laid out flat in the sun for 2 –3 days before being tipped on their sides for another few days. During the rainy season, the bricks are covered with plastic sheets. After this initial sun drying, the bricks are then stacked under open sided sheds for air-drying. The length of time that bricks are air-dried depends upon the season, ranging from 30 days in the summer months to 45 – 60 days during the rainy season.

4. kiln drying: The dry bricks are then stacked loosely in open air kilns without chimneys. These kilns are rectangular or circular shapes, with bricks stacked around open fires of wood, or wood mixed with rice husks. Mud is plastered around the outside of the brick kilns to trap the heat from the fire, with space for smoke to escape and oxygen to enter. The average height of a brick kiln is 2 meters tall. Bricks are typically kiln dried for 10 – 14 days

5. distribution: Most brick manufacturers sell their bricks directly to masons, home owners, brick distributors, and /or building supply stores. As transportation charges are typically 30 - 60% of the total brick price, manufacturers who have their own trucks can charge higher rates for their products. Depending on the demand, brick producers either receive payment when the supplies sell their bricks, or when they are placed in the kilns.

key findings

Brick Manufacturers

- 53% of all brick manufacturers interviewed during this survey reported that they had lost a significant portion of their production due to kilns collapsing during the earthquake. While many of the big producers have been able to salvage some of their products from the collapsed kilns, the survey suggests that over 50 million bricks throughout the region were damaged in the earthquake.
- The most severely affected of all brick manufacturers are the small-scale brick manufacturers, who produce an average of 15,000 bricks per month. In Padang Pariaman, there are perhaps as many as estimated 1800 small-scale brick producers. As the financial capital of these producers is often tied up in the number of bricks they have in their kiln (the final production stage), the ability of these producers to re-start production is hampered.
- Small-scale brick manufacturers typically sell their bricks in local markets for housing construction, either directly to homeowners, masons or local supply stores. Medium scale manufacturers (45,000 + per month) often have their own trucks or transport arrangements, enabling them to sell bricks to more distant suppliers at a higher price.
- Although medium scale manufacturers interviewed in this survey also suffered production losses due to the earthquake, their stronger financial position means that they are more readily able to resume production than smaller producers. It will take an estimated 6 –8 weeks for these manufacturers to bring new bricks to the market.
- Most of the larger scale brick manufacturers and suppliers are located in Bukittinggi and Lubuk Alung, located 90 and 30 km NE of Padang. Some large brick manufacturers in this area report losing 35% of their brick production in the 30 September earthquake, while others report no significant losses.

Brick Prices and Financing

- Pre-earthquake brick prices ranged considerably according to quality, seasonality, and transport costs. During low demand periods such as Ramadhan, some large manufacturers and suppliers reported selling their brick stock at IDR 250 (approx. USD 0.02) per brick. Typically, brick prices range from IDR 300 – 900 each, with the higher price including transport charges. In Bukittinggi, the best quality bricks for higher end residential and commercial buildings cost IDR1300 (USD 0.14).
- Current prices from suppliers for mid range quality bricks have increased by 25 - 50%, or approx. IDR 750 – 900 each. It is likely that brick prices will continue to rise, and will soon exceed the IDR 900 threshold after the March 2007 earthquake in Padang.
- Both small and medium scale brick manufacturers use informal credit and selling arrangements with their customers and distributors. Local supply stores typically pay small-scale manufacturers for bricks once they've sold.
- All brick manufacturers, but especially small and medium scale producers, have limited storage and warehousing space. While space limitations force manufacturers to move their

bricks to market quickly, it encourages large suppliers and distributors to increase their prices to meet speculative market demand.

Brick Demand

- 60% of all households interviewed indicated that they would re-use as many bricks as possible from their damaged homes. The number of usable bricks suitable for construction purposes is unknown, but a rough estimate suggests that many households will be able to salvage 800-1200 bricks from the rubble. As an average size brick masonry house of 10m X 12m uses approx 10,000 bricks, approximately 10% of this demand will come from recycled materials.
- Although 67% of all households interviewed said they lived in a brick masonry house before the earthquake, 54% of the brick masonry households indicated they would prefer to rebuild a timber and brick houses. Safety concerns are most often cited as the reason for this preference, followed by cost considerations.
- Although estimates of the number of damaged commercial and government buildings in the provincial capital of Padang are unknown, it can be expected that majority of the brick production of the large scale - brick manufacturers will be diverted from rural housing needs to meet urban reconstruction demands. Medium scale brick manufacturers located close to Padang are also likely to market their bricks for commercial / government reconstruction needs.

Gender Issues

- Women make up 40 - 60% of the labour force of small and medium scale brick manufacturers. They typically are paid on a piecework basis for each brick they make. Male brick labourers are likely to receive a daily wage for their work.
- As current brick production for many small-scale producers is paralyzed, the ability of brick making women to earn wages is temporarily disrupted.



possible reconstruction scenarios

Based on the findings of this survey and discussions with key informants, the authors of this report suggest three (3) possible reconstruction scenarios:

1. Earthquake damages to regional brick production capacity will likely lead to higher brick prices and delays in rural housing reconstruction. Large brick manufacturers will likely resume their pre – earthquake production capacity within two months. Major brick distributors are likely to purchase bricks from non – earthquake affected areas. As transportation costs are 25-50% of the total brick price, a price increase of 100-150 % per brick is likely to be seen by early 2010.

2. Small - scale brick manufacturers will be slow to resume pre-earthquake production levels without financial assistance or favourable credit terms. As many small- scale brick manufacturers have their financial capital tied to their monthly brick production, earthquake losses have hit these manufacturers the hardest. Their ability to resume production is restricted due to capital shortages, or favourable credit arrangements.

3. The preference and demand for transitional shelters using timber and bricks is high, and likely to increase. Over 60% of earthquake affected households interviewed in this survey indicated they plan to rebuild (or would prefer) timber frame houses with brick masonry infill walls over full masonry construction. Concerns over seismic safety, speed of construction, and lower cost are the main reasons cited by households for this change in preference. As more pilot projects or demonstration models of transitional shelters are built in earthquake-affected areas, this demand is likely to increase.

recommendations

Clusters (ESC and Early Recovery)

1. To assist beneficiary and NGO-led transitional shelter construction using timber frames and masonry walls, **technical guidelines on safe building techniques for hybrid construction should be produced and disseminated** in local languages.
2. ESC member agencies should support **the mapping of locations of small scale brick manufacturers** in earthquake affected villages, and **encourage NGOs involved in construction to adopt a local brick procurement policy**.
3. A **technical working group focusing on improving the quality of regional brick production** should be set up. One possible output of this working group might be a **buyer's guide to quality bricks**, translated into local languages.

NGOs / IOs

4. NGOs engaged in transitional shelter projects should consider making **microcredit loans or cash grants to small - scale brick manufacturers** as a means of helping these critical producers return to, and possibly increase, brick production. An investment of IDR 25,000,000 to 50,000,000 (USD 2,600 to 5,400) would enable many small scale producers to resume – and perhaps double – their monthly brick output.
5. When planning or implementing hybrid or brick based masonry shelter projects, NGOs/IOs should **bear in mind the environmental impact of increased brick production**. Three basic questions that NGOs should ask of brick suppliers or manufacturers are: Where does the fuel used in brick kilns come from? Is the clay or sand used in brick production contributing to future landslide risks? What is the travel distance between brick production and end use?

Government

6. National government plans for **financial compensation** to earthquake - affected households **should reflect the expected increase in price of bricks** for rural housing reconstruction.
7. Regional government plans for **reconstructing earthquake-affected government buildings in Padang should not take priority over rural housing construction**. As bricks are a primary building material for residential and commercial / government buildings, efforts must be taken by the regional government (a large brick consumer) to avoid excessive price increases that might restrict poor household's ability to purchase bricks at a reasonable cost.

acknowledgements

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