

# Lessons from Hanshin-Awaji Earthquake and Challenges of Japan



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# Summary of the damage

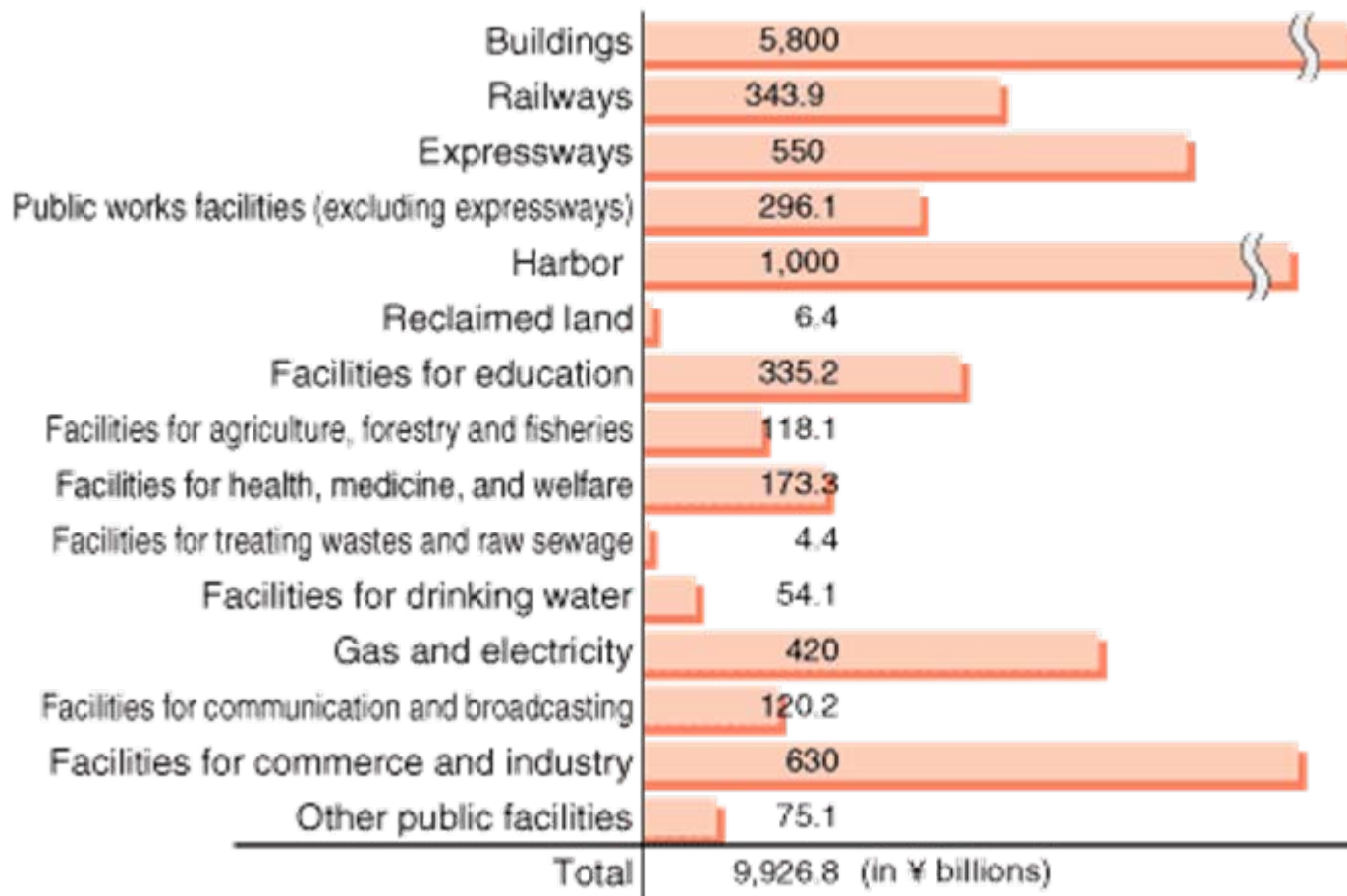
The Hanshin-Awaji district was hit by a violent earthquake which took the precious lives of over 6,400 people in just 10 seconds when the earth trembled.

## Approximately Damage

- Dead 6,400 people
- Destroyed 250,000 buildings
- Burned 70 ha
- Loosed \$ 90 billion

# Amount of damages

**Amount and Breakdown of Damage (Estimated as of April 5, 1996)**



# Main types of the damage



# Causes of casualties

Most of direct death were caused by collapsed houses and burned houses.

Main Cause of Direct death	No. of death	
(1) Collapse of Buildings	4,831	88%
(2) Fire	550	10%
(3) Others (Land Slide, Transportation)	121	2%
<b>Total</b>	<b>5,502</b>	

# Causes of indirect death

Casualties caused by not only direct shocks, but also indirect shocks, like as lack of refuge life support.

About 900 died of a disease for cold and heart troubles.

Indirect death were brought by bad refuge life, that extended for a long term and was overcrowded.

These bad refuge conditions caused by many houses broken.

Indirect death came also from vulnerability of houses .

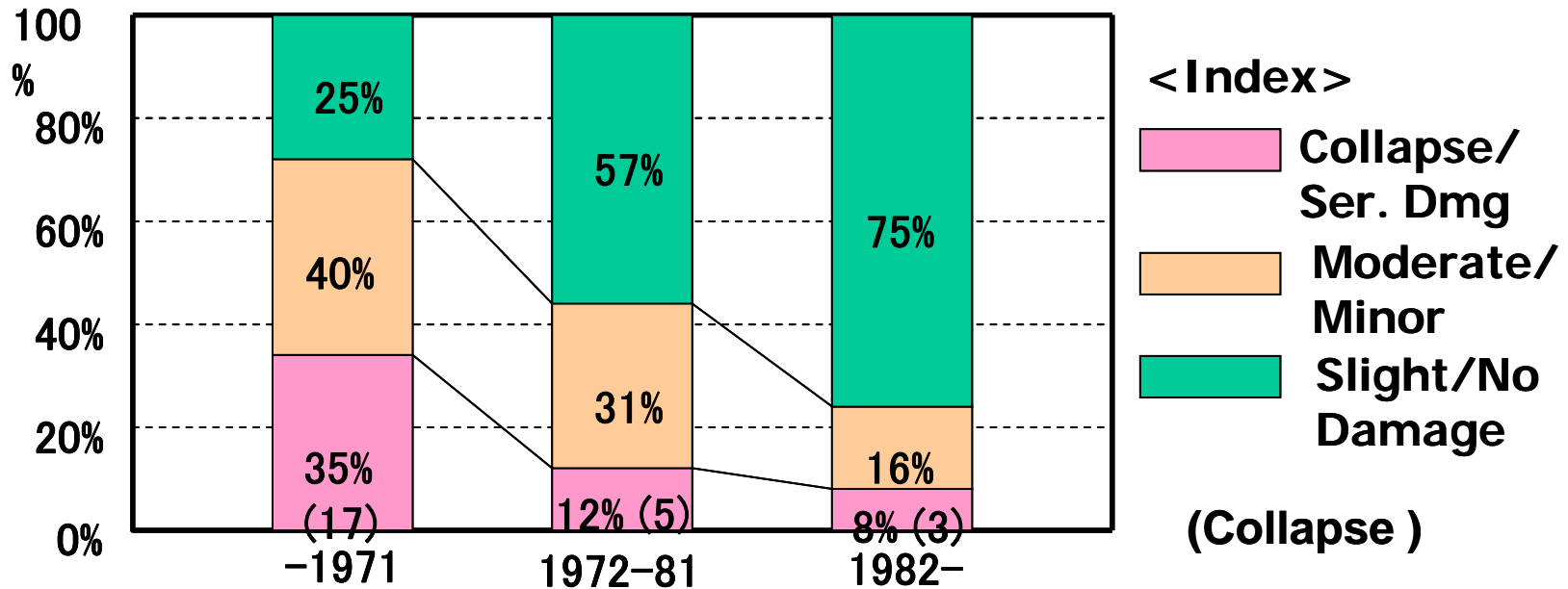
# Causes of house collapsed

A basic cause of collapse did not have a structural proof stress. Lack of structural proof stress depends on

- 1) design (including regulation)
- 2) execution (including violation)
- 3) maintenance (including lifestyle)

# Collapse rate by construction generation

<Data from building survey in Central Kobe: 923bldgs>





# Housing reconstruction

After the earthquake, 50,000 emergency temporary homes were built in an approximately seven-month period, and 40,000 publicly operated permanent homes were built in an approximately five-year period.

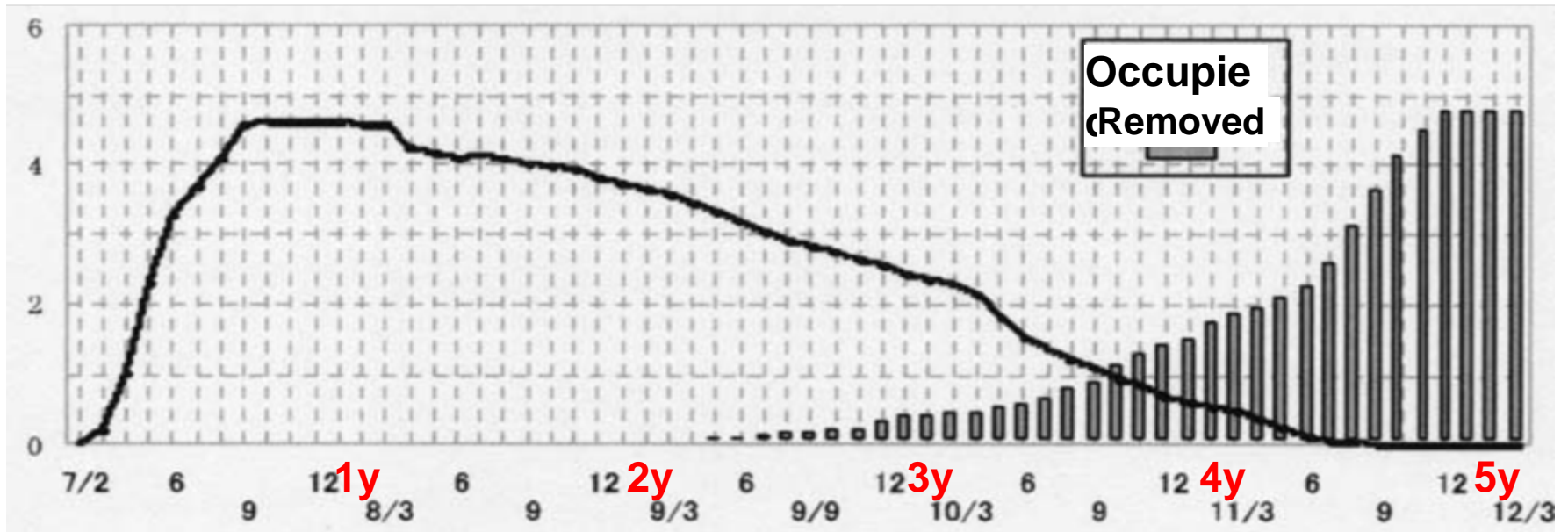
- Eligibility for such housing was limited to low-income individuals and aged people.
- Construction time was long.
- The housing was built far from the disaster areas.

# Housing reconstruction



# Emergency temporary houses

Moved to permanent houses by  
Jan.'05(5years)



# City reconstruction

In the communities where street planning and urban redevelopment projects have been implemented, roads, parks, and other infrastructure were further developed, which in turn contributed to rebuilding the communities into a safe urban environment.



# Create security and symbiosis



# Lessons from earthquakes and challenges

- 1) We have to decrease preventable death in the world.
- 2) Mitigation and preparedness are most important.
- 3) We have to increase and integrate hardware, software and humanware.