

POVERTY AND ENVIRONMENTAL DEGRADATION AMONG URBAN SQUATTERS: A LITERATURE SURVEY AND THEORETICAL FRAMEWORK

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ABSTRACT

Economic development in Malaysia has been associated with environmental degradation. This is mainly attributed to rapid industrialization, especially in the urban areas, which has also been a significant cause of rapid urbanization. The process of this economic development has led to the absolute increase in the urban poor in Kuala Lumpur City. Moreover, poverty and economic hardship leads the people to leave rural areas to the cities for a better life. Due to high rental rates they mainly squat on government or private individual land in the cities. Low incomes very often force people to live cheaply in dangerous and unhealthy places. Environmental degradation in the squatter areas are exacerbated by the fact that these areas are essentially characterized with inefficient households waste management systems, inadequate quality houses, inadequate local facilities, inadequate water supply and sanitation, and poor drainage. The poor are often provided with only very limited amenities and other basic needs. This paper discusses the link between poverty and environmental degradation in the squatter areas based on a literature survey. It will also present a theoretical framework for analyzing the linkages between poverty and environmental degradation, considering the nature and extent of poverty, squatter settlement, and environmental degradation. Several issues that are related to the squatter households such as their socio-economic characteristics as well as the quality of their houses, quality of local facilities, quality of health would be explored. In fact, there is a need to recognize the difficulties experienced in managing environment in squatter areas and to understand the reasons for those difficulties. Finally, this paper briefly reviews possible options and recommendations or action that will improve environmental quality and alleviate poverty among the squatters.

Key words: Urban Poverty; Environmental Degradation; Squatter Settlement; Solid Waste Management; Householder's Knowledge, Attitude, and Behavior.

1. INTRODUCTION

The poor in developing countries are often assumed in processes of environmental degradation. In most cases, they appear to be at the same time both its victims and its unwilling agents. But, poor urban people are more clearly victims rather than agents of degradation. Researches indicate that the underlying causes of both poverty and environmental degradation are mainly lie in and are structured by uneven processes of development. Urban environmental degradation primarily effects people's health status, rather than their incomes and assets as in rural areas (Hardoy, Cairncross, and Satterthwaite; 1990). However, the relationship between poverty and environmental degradation in developing countries has been the focus of many debates. One view explicitly attributes the causes of environmental degradation to poverty and it is argued that deprivation and the inherent short time horizons encourage over-exploitation of the physical environment so leading to further impoverishment. Thus, poverty alleviation is identified as the major prerequisite of any effective environmental policy. Since the 1970s it has been almost universally agreed that poverty and environmental degradation are inextricably linked. The link between poverty and environment were also seen to be self-enforcing. There are rapidly growing literature on the linkages between poverty and environment and almost all of these studies point to demographic, cultural, and institutional factors as important variables those are affecting these linkages. But there are important differences exists between poverty-environment linkages both in urban and rural areas. In the rural context, livelihoods depend more directly on natural resources, which influences the factors behind degradation of resources. In the urban context, livelihoods depend on cash-based income streams and assets and thus urban environmental degradation is primarily associated with health impacts. Several recent descriptive studies covering cities in Asia, Africa, and Latin America have stressed the health impact of negative environmental conditions in urban areas (Hardoy and Satterthwaite, 1985 and 1989; International Labor Office, 1992; Hamza, 1992; Benneh, 1992). These studies suggested that inadequate household waste management systems, inadequate or polluted water supplies, lack of sanitation services, and pollution due to toxic chemicals were important environmental factors affecting the health of urban populations those are especially in the lower income areas. The health impacts of those environmental factors in urban areas had been considered at several levels: home, workplace, neighborhood, and wider city environment (Hardoy and Satterthwaite, 1989).

2. POVERTY, DEVELOPMENT, AND ENVIRONMENTAL DEGRADATION

A number of descriptive studies consider population and the environment in relation to the wider issues of poverty and development (Hardoy and Satterthwaite, 1985 and 1989; Durning, 1989; Stupp and Bilsborrow, 1989; Camp, 1991; Keyfitz, 1991a-d; Swedish International Development Authority (SIDA) 1991; DeWalt and Stonnich, 1992; International Labor Office, 1992; World Bank, 1992). Although, only a few studies have formulated specific indicators of poverty (Bilsborrow 1992b; Cruz *et al.* 1992; Mink, 1993). However, the linkages between poverty and environmental degradation among the lower income groups of communities in relation to the economic development have been less obvious or highlighted in the previous studies. So, specific research on poverty and environmental degradation that addresses such linkages can contribute to a greater understanding of what constitutes "sustainable development". It is now widely recognized

that the growing problems of urban poverty and of environmental degradation associated with urban development are linked, and that urban poverty is a major cause of environmental degradation. Although a significant decline in poverty in Malaysia has been achieved due to the country's economic growth, government spending and subsidies, but poverty is still severe among different groups of communities. With rapid urbanization, the percentage of urban poor in relation to the total poor in the country has been increasing steadily (Kassim, M.Y. 1991). Urban squatters in Kuala Lumpur City make up a significant proportion of the urban poor. During the 1990s, the urban poor were defined as those whose incomes fell below M\$675 per month. Using this as a measure, about 35 per cent of the population of Kuala Lumpur alone, or approximately 300,000 people, could be classified as urban poor, eighty percent of whom were squatters. Moreover, urban low cost flat dwellers also make up a significant proportion of the urban poor.

Most research into urban areas revealed that the most visible indicator of poverty in the city is the poor quality of people's houses and environment. Moreover, most of the available literatures on urban squatters tend to portray them as agents of environmental degradation (DBKL, 1981; Tsen N.V., 1991). But the impact of environmental degradation on the socio-economic well being of the urban poor is less obvious or highlighted in studies on squatters. A survey of recent literature (Amirah *et al.*, 1995; Othman *et al.*, 1998; Peterson *et al.*, 1997; Osman *et al.*, 1991; Noordin, 1996; Ibrahim, 1996; Yusof *et al.*, 1995; Sani, 1993; Agus, 1994 and Murad, 1999) reveals current research interests in the area of poverty and environment among squatters.

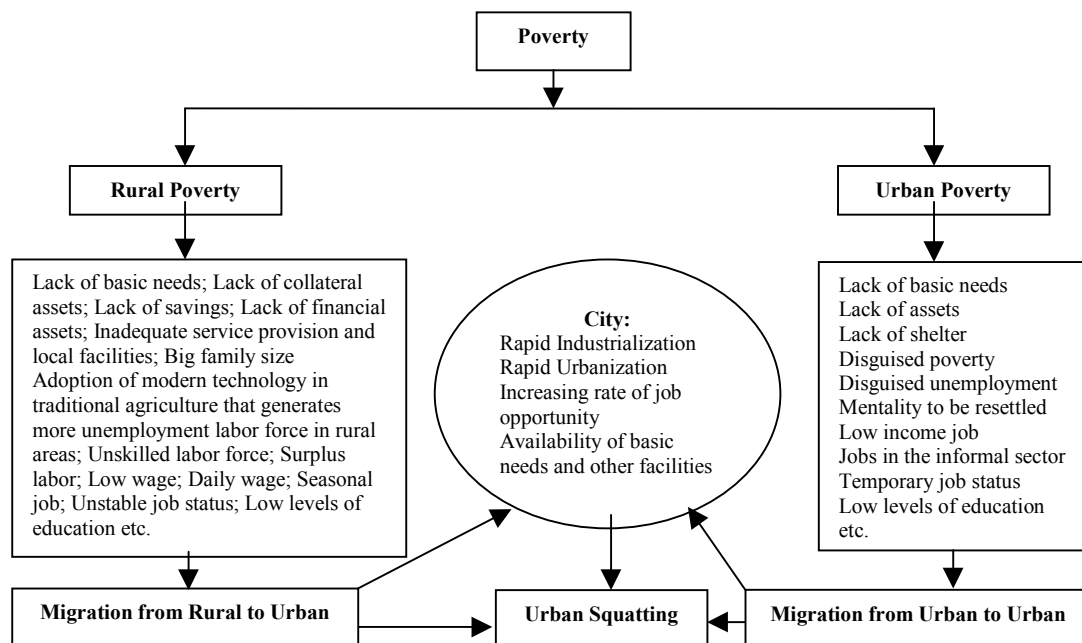
3. THEORETICAL FRAMEWORK

This section of the study illustrates some of the major issues and causes of urban poverty and environmental degradation in Kuala Lumpur City following rapid development and population growth. Several of these issues and causes are obviously peculiar and specific only to Kuala Lumpur due to its location, topography, history and the detailed manner in which development has been planned and executed. But many of the issues are also common to many cities in developing Southeast Asia and the APEC region and are therefore applicable to them as well. However, Malaysia has experienced spectacular urban spatial transformations from 1970 to 1997. During this period, Malaysia's national development strategies have been structured around urban-based industrial growth. This in turn, not only have urban units increased in number, the larger urban centers have expanded outwards to burst out of their gazetted boundaries, to sprawl into the open spaces into the rural area. This expansion is in response to the increasing number of people coming to settle in the urban areas due to their economic hardship in the rural areas. Moreover, Malaysia's economic downturn in 1998 also pushed a substantial number of low-income people out of the formal sector not only in employment, but also in housing. For many, rents became too high, or low-income housing was simply too far from jobs to be viable. So, driven out of formal housing markets by high prices, distance to work, cost of transport, or other factors, the poor very often squat on land no one else wants. Often this is because of environmental dangers - steep slopes, hazardous waste landfills, high pollution areas near factories, areas that flood easily or because these are protected ecological areas. Thus, urban poor people tend, inadvertently, to aggravate adverse environmental conditions that are also harmful to them. Such urban squatter settlements are almost always illegal and also common in most countries of developing Asia, although

local officials have often been ignoring them. Various studies reveal that the Malaysian population is increasingly urbanized. From about a quarter of the total population who was "urban" in 1970, the total increased to about half of the population in 1991. The level rose to about 55 per cent in 1995 and is expected to be more than 60 percent in the year 2005. Several factors have contributed to the increase in the urban poor since 1980s among those rural-urban and urban-urban migrations and the economic crisis are most significant.

Moreover, urban growth itself has been largely generated by a rapid increase in population. Poverty and economic hardships in rural areas combine to stimulate outmigration from rural to urban areas. Because the urban economic base, supported by the expansion in the manufacturing and construction sectors, trade, commerce, finance, and transportation networks has enabled the urban population to enjoy higher incomes and a better quality of life than their rural counterpart. During the Sixth Malaysia Plan (1991-1995), average monthly urban household incomes increased at 8.1% per annum, compared with rural incomes which increased at 5.3%. Reflecting this, urban population increased by 4.5% per annum during the Sixth Malaysia Plan, compared with total population growth of 2.7%. The urban poor are most obviously referred as squatter household, which is a product of the rural-urban migration, although there are some households among the squatters those migrated from urban areas. More particularly, urban squatter settlements absorbed not only new migrants from rural areas but also displaced urban dwellers. Figure 1 shows a theoretical framework on the nature and extent of poverty and squatter settlement Malaysia. The consequences, however, of such rapid urbanization is in the growth of urban slums and squatter settlements, and the overburdening of the water supply, sewerage and waste disposal systems, thus, resulting in environmental degradation.

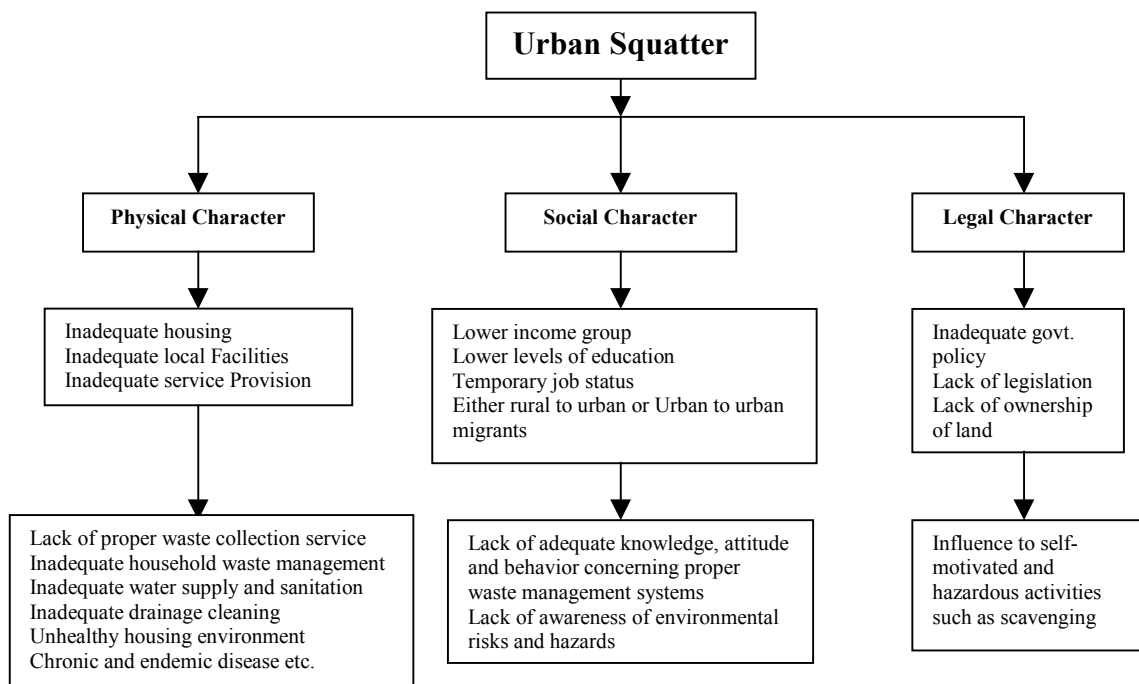
Figure 1: Nature and Extent of Poverty and Squatter Settlement in Malaysia.



4. CHARACTERISTICS OF THE SQUATTERS

The characteristics of squatter settlement vary widely from country to country and depend on a variety of defining parameters. In general, squatters can be defined as people who live in an illegal dwelling. They are found mostly in developing cities. As cities begin to grow as centers of government or as centers of production and commerce within an increasingly inter-related world market, new neighborhoods begin to occupy unused land near the city center or close to where jobs are available (Hardoy *et al.*, 1995). In Kuala Lumpur City, squatter housing is characterized by their illegality, in that the land is occupied illegally, the site and the building constructed are developed illegally, and the settlements are often in conflict with zoning and building regulations. Urban squatter settlements typically appeared in areas at high risk from natural or man-made disasters, such as floods, mudslides, diseases, or industrial hazards (UNEP 1995, 49). Squatter settlements in Kuala Lumpur City are mainly either in peripheral areas with sparse or nonexistent urban services such as education, health, transport, waste disposal, water supply, sanitation, etc., or in high-risk inner city areas. Moreover, squatters are very often categorized as the urban poor because the majority of the city's lower income groups live in squatter areas. Squatter areas have grown in such large size and numbers that it has a strong influence on the planning of Kuala Lumpur City. However, there are essentially three characteristics of the squatter settlements in Kuala Lumpur City and the reason behind them being inter-related that can be understood from the Figure 2.

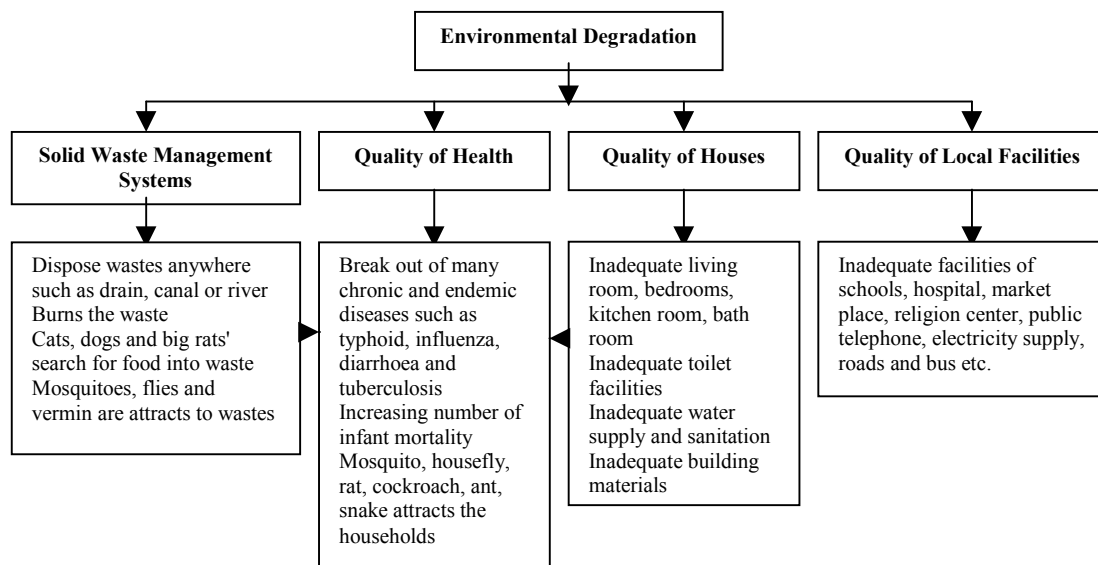
Figure 2: Characteristics of Urban Squatters.



5. ENVIRONMENTAL DEGRADATION AMONG THE SQUATTERS

In Kuala Lumpur City, most of the squatter settlements are generally characterized by the absence or severe lack of basic infrastructure services such as waste disposal, sanitation, water supply, sewerage and drainage, roads, health care, education centers etc. Because squatter areas are generally underserved with public amenities and basic needs and thus, they invariably become potential sites for various types of environmental degradation. Squatter areas are often portrayed as villages in the city, which are cluttered, lack of infrastructure facilities, and are exposed to fire, floods and other natural disasters (Noordin 1996). Dwellings are generally made of discarded materials such as scraps of used wooden planks, bits of plastic, corrugated metal, asbestos sheeting and even cardboard. Population densities in such communities are high and malnutrition is often widespread. Inadequate waste management, water supply, and sanitation facilities result in a high incidence of environmental diseases among squatter households. Figure 3 indicates four types of the major environmental degradations and their consequences among the squatters in Kuala Lumpur City.

Figure 3: Environmental Degradations and their Consequences among the Squatters in Kuala Lumpur City.



There are also problems of the lack of cleanliness in the living area and congested living conditions, which result in the squatters living in unhealthy conditions. Due to the lack of sanitation facilities and waste disposal sites, wastes are also thrown into the Klang River and other places. Although 58.9 percent of squatters have proper sanitation facilities, 41.1 percent are still using the traditional methods of sanitation. Table: 1 shows the percentages of squatter areas who have access to public amenities, methods of sanitation, and disposal of waste. This together with the improper method of waste disposal puts them at a high risk of contracting infectious diseases. Many endemic diseases such as diarrhea, typhoid, food poisoning and infant mortality are common among the squatter residents. In addition, the cramped conditions in which they live mean that communicable disease such as influenza and tuberculosis that are easily transmitted.

Public Amenities	%
Paved Roads	82%
Lighted Paved Roads	32%
Electricity	84%
Safe Water Supply	87.7%
Pipes in Houses	59.4%
Public Water Standpipes	28.3%
Sanitation	
Concrete Septic Tank	58.9%
Open Toilets	25.1%
Use Rivers	8.9%
Others	7.1%
Disposal of Waste	
Make Use of Public Utility Supplied	49.7%
Open Burning	31.9%
Rivers	6.5%
Indiscriminate Disposal	5.2%

Table 1: Percentages of Squatter Areas Who Have Access to Public Amenities, Methods of Sanitation, and Disposal of Waste (Source: Noordin 1996).

6. HEALTH IMPACT OF ENVIRONMENTAL DEGRADATION

The health impact of environmental degradation among the squatter households has long been recognized. In fact, indisputable evidences ties deteriorating health to the degradation in the quality of physical environment, including inadequate water and sanitation, overcrowded living conditions, air and water pollution, uncollected rubbish, and hazard prone living conditions (WHO, 1995). Many health problems are associated with overcrowding, including household accidents, acute respiratory infections, tuberculosis, and other airborne infections. Diseases such as tuberculosis, influenza, and meningitis are easily transmitted and low resistance amongst the poor squatter households due to malnutrition and frequent contacts often aids their spread. The City Hall of Kuala Lumpur (DBKL) has identified the problems related to health are the dominant amongst squatter households in Kuala Lumpur City. Poverty is the main obstacle in achieving a healthy life. Squatters are particularly affected because since they live in illegal settlements, they have been deprived of much of the basic services such clean water supply, garbage disposal, and sanitation (Khairuddin 1984). With the lack of basic necessities such as sanitation facilities, water supply, and sewerage services coupled with overcrowding and habitats of the urban poor, the re-emergence of communicable diseases may become a threat (Abu Bakar 1996). The squatter areas have been identified as having the highest number of communicable disease occurrences in the city. In 1994, the highest number of cases for communicable diseases was tuberculosis with 1,125, followed by dengue fever (401), syphilis (59), leprosy (37), dengue haemorrhagic fever (35), gonococcol infection (33), malaria (28), measles (21), and others such as typhoid, whooping cough, and typhus which were negligible (Department of Statistics 1996 and DBKL 1994). The health impacts due to the lack of basic services can be explained in several ways. For example, adequate and clean water is necessary for the households for their daily activities. Limited quantity of

water means inadequate supply that causes, in many cases, eye and ear infections, skin diseases, scabies, lice, flea, and other ill health phenomena associated with personal hygiene. The lack of proper drains for disposing of human excreta and wastewater are also common among squatter areas. Having proper drains facilities are important because, water-logged soils, clogged drains, and stagnant pools can transmit diseases like hookworms, enteric diseases, and provide breeding grounds for mosquitoes which spread filariasis, malaria, and other diseases. All these conditions also exacerbate the risk of food contamination, which contributes to a high incidence of acute diarrhea and other food diseases like cholera, typhoid, and parasitism (McGranaham 1992).

Halimah (1997) conducted a study among squatter families and families living in low-cost flat dwellers in Kuala Lumpur which revealed that young children are to be quite prone to infections such as fever, cold/cough, asthma, skin problems, and diarrhoea. The major causes of such ailments are air pollution, unsafe water supply, and poor sanitation. In the study, the youths were also asked about their living conditions and they indicated that their uncomfortable home environment was the main reason why they spent most of their time outside their home: 30.6 percent left home during the day, 9.7 percent left at night, 26 percent looked for a place outside the home to stay, 39.5 percent would go out to rest, 30.6 percent went out for recreation and relaxation and 1.6 percent said they were often depressed. Many of them felt that they were suffering from problems such as fighting with parents (8.9%), inability to go home (4.8%), disobedience (23.4%), running away from home (3.2%), breaking school rules (22.6%), and theft (2.4%). The rest said they drank, took drugs, and were involved in gang fights.

In Kuala Lumpur City, most of the squatter houses/areas are situated close to unsuitable sites such as waste disposal sites, factory/industry sites, ecologically fragile sites etc. The impact of unsuitable sites on health is the result of everyday risk, seasonal risk, and occasional but high risk from a particular event (Hardoy, *et al.* 1995). For example, settlements situated close to waste disposal sites; industry/factory sites can be affected by the exposure to certain chemical and pathogenic pollution that are detrimental to the health of the population. Moreover, poor quality of houses, quality of local facilities, and living environment are often associated with depression, drugs, and alcohol abuse, suicide, violence, and so on. All of the above mentioned environmental bad elements/practices are common in the squatter settlements and thus, the people of these settlements are also exposed to these impacts of the environment.

7. MANAGING THE URBAN SQUATTER SETTLEMENTS

The Government's authority (DBKL) has been quite successful for reducing and/or upgrading a substantial number of the squatter settlements in Kuala Lumpur City. Under the Local Government Act 196, there are provisions under Section 72 Part IX for local governments to build low cost housing unit for the poor, create job opportunities in trade and industries, develop industrial and commercial areas. The by-laws under Section 101 of the Act relate to health, and the provision of basic amenities for the safety and comfort of its residents. However, DBKL has also been quite successful in carrying out their responsibilities under these provisions. Since 1970, DBKL has built not less than 60,000 units of low cost houses for sale or rental. The rental rates for the houses are RM 124 a month for a two-bedroom unit with an area of between 550-650 sq. feet. Low cost units are

sold at RM 25,000 for those not earning more than RM 750 a month. The lack of finance and support from other sectors is reducing the amount of houses built to relocate squatters. In 1994, the government set up a Housing Fund for the Poor (*Skim Tabung Perumahan Rakyat Termiskin*) which aims to relocate squatters and the urban poor earning less than RM 500 a month. Under this scheme, DBKL has built 5273 low cost flats rented out at RM 124 a month.

DBKL has taken serious efforts in reducing the amount of illegal settlements in Kuala Lumpur and the Kuala Lumpur Structure Plan 1984 outlines the policies and initiatives for squatter areas. There are two types of approaches taken by DBKL on squatter relocation. Firstly, when a squatter area has been earmarked for immediate development, squatter residents are given priority to rent or purchase new houses, or relocated temporarily to flats or long houses. Second, where an area is not effected by development plans within the next three years, plans or projects to improve the quality of living must be carried out. Facilities such as paved roads, water and electricity supply, streetlights, waste disposal, and sanitation facilities are provided. In the meantime, community amenities, such as community halls and clinics are built to ensure comfort, health, and welfare of the squatters. About 255 squatter areas in Kuala Lumpur have been provided with these facilities as shown in Table 2.

Amenities	Nos.
Surau (Prayer Room)	82
Public Hall	70
Markets	4
Nurseries	40
Playground	12
Clinics	5
Public Telephones	135

Table 2: Public Amenities for 255 Squatter Areas under DBKL Jurisdiction 1996 (Source: Noordin 1996).

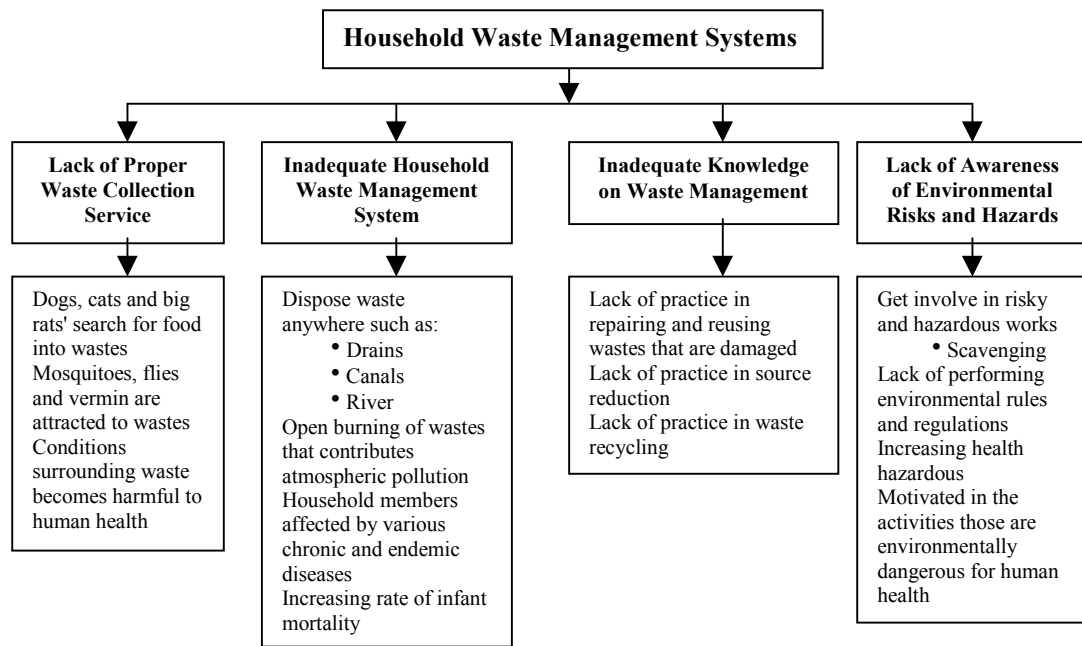
However, housing for the urban poor is still a priority in the DBKL budget. In the DBKL budget for 1998, 10.1 percent or RM 62.41 million of its RM 614.56 million allocated for development has been assigned to the development of public housing and housing for the poor scheme. This roughly translates into the development of 65,000 low and medium cost flats by the year 2005. Other programmes include the construction of 3327 units of low and medium cost flats and houses under the Low Cost Housing Revolving Fund at a cost of RM 270.8 million. On the broader scale, the government also prepared a comprehensive intervention programme to resolve the squatter problems in Kuala Lumpur. For example, in 1980, DBKL established a Squatter Upgrading Program namely NADI to provide assistance to the urban poor and raise their quality of life where the level of socio-economic, health, and infrastructure are relatively low. Government and non-governmental organizations jointly carry out various projects and activities. Under NADI, a programme called the Sang Kancil Programme has been very successful in achieving NADI's overall aim. Health provisions, pre school education for children, and a maternal and child health clinic have been established throughout the squatter areas in the city. The programme has successfully solved some of the health and socio-economic problems of squatter residents (Mohd. Razali Agus 1997). Under NADI, a programme called 'Privatization of Housing for

the Poor' was also initiated in 1980 to encourage private developers to transform squatter settlements into a planned township with sound infrastructure and social amenities. One of the most successful case studies is the Desa Pandan project where 1,700 families, or 85,000 people, lived in dilapidated conditions. The land was transferred to a private developer who is solely responsible for the implementation, sales, and maintenance of the project. Every squatter was offered a housing unit at a subsidized price. The environment and quality of urban living in Desa Pandan have greatly improved through this programme, and this has enhanced social interactions among the residents through common facilities such as a sports complex, playground, schools, and commercial facilities.

8. MAJOR ENVIRONMENTAL PROBLEM AMONG THE SQUATTER HOUSEHOLDS

Malaysia is rapidly becoming more affluent, industrialized, and urbanized due to its rapid economic growth over the past decade. The major consequence of Malaysia's rapid economic and social transformation is a greatly increased generation of municipal solid waste (MSW). In some urban areas, Malaysia's current estimated rate of MSW generation (0.93 kg per capita per day) has grown to be nearly as great as that on average in the European Community (Arango and Bertuzzi 1994; Nasir, *et al.*, 1995). The World Bank (1992) has identified MSW management as one of Malaysia's three most important urban environmental problems. Thus, the principal concern in urban areas is the management and disposal of an increasing quantity of waste, which contribute to major environmental degradation especially in the squatter settlements. Although, the provisions of other urban services such as piped water supply, sanitation, electricity, drains, paved roads, and other forms of essential infrastructure and support have been provided throughout the urban areas in a reasonable manner, but the problem with which the squatter households are invariably related is solid waste management. While some of the squatter households in Kuala Lumpur City have reasonably proper waste disposal and sanitation facilities, most of them are still using the traditional method of waste disposal and sanitation. The waste generated from the squatter of Kuala Lumpur City areas amount to about 200 tones per day (Ibrahim 1996). As squatter areas are generally undeserved, only half of this amount is collected each day from central collection points (Noordin 1996). Current estimate shows that squatters dispose of their waste as follows: 49.7% in waste site allocated, 31.9% by open burning, 6.5% into the river and 5.2% by others means. That means, inadequate and traditional waste management systems are the norm in the squatter areas. Figure 4 shows the major environmental degradations and their consequences that are related to household waste management systems among the squatters in Kuala Lumpur City.

This inadequate or traditional system of waste management does not affect only their own environment and health but also equally affect the neighboring areas environment and human nature. The important reasons behind these problems are the poverty, inability, and the lack of environment related knowledge among the squatter households. The disposal of waste is a major problem to the squatter households because; these improper methods of waste disposal make them a high-risk group for contracting infection diseases. Many endemic diseases such as diarrhoea, typhoid, food poisoning and infant mortality are common among the squatter residents. In addition, the cramped conditions in which they live mean that communicable disease such as influenza and tuberculosis that are easily transmitted.



9. POVERTY AND ENVIRONMENTAL DEGRADATION: CASE STUDY OF HOUSEHOLD WASTE MANAGEMENT SYSTEMS

This section summarizes possible linkages and interrelations between poverty and household solid waste management systems among the squatters in Kuala Lumpur City. Various field survey reports and case study results have been examined to identify the linkages and interrelations. Most of these surveys and case studies were conducted amongst the squatters in Kuala Lumpur City during the last five years. Most of the surveys and case studies were broadly entitled "Household Solid Waste Management Systems" and this study is an effort to explore the possible linkages and interrelations within the consideration of its overall objective. Because of very limited literature especially on the poverty and household waste management systems, the study would only discuss the possible linkages among the squatter households in the area of Kg Dato' Harun under the Petaling Jaya Municipality, near Kuala Lumpur City. Although, the study would not focus throughout the entire squatter areas of Kuala Lumpur City, but it would still be able to address the linkages and interrelations between poverty and household waste management systems among the whole squatter groups of communities in the country.

9.1 Socioeconomic Characteristics of Squatter Households

In the overall study, literatures were reviewed mainly in the Kg Dato' Harun area within which 40 percent houses are categorized as squatter. Mothers or wives are playing larger relative roles in the family with the average age of household heads is 41.8 years in the area. The most common highest level of education obtained by the household head in this area is 44 percent primary school and 22 percent junior school (SRP/LRC) and the average level of education for squatter households head's is below the primary school. In terms of income, Kg Dato' Harun is heavily concentrated in lower income ranges. The ranges of total household income per month is found in this area are 5.6 percent RM<500, 28.6

percent RM501-1000, 46 percent RM1001-2000 and 19 percent RM2000-4000. But the average household income per month for most of the squatter households is found to be below the poverty line income. The ethnical proportion of squatter households differs significantly among areas. As in 1992, the ethnical proportions of squatter households for Kuala Lumpur City are comprised of 34.2 percent Malay, 44.5 percent Chinese, 15.4 percent Indian, and 5.8 percent other. But the above proportions greatly differ in the area of Kg Dato' Harun with 91 percent Malays by far the dominant group. Upon considering the monthly household income and ethnic group, a strong association is found between two of them. That means the Malays generally report lower monthly income. Moreover, the association between ethnic group and household education level is also found to be strongly correlated. Because, Malay households generally have the lowest level of education with most of them are having the primary or junior school education only. The average total number of household members in the area of Kg Dato' Harun is 5.52, which is inversely associated with the monthly income. Because, the lower level of income the higher the family size is found in the area. The association between household size and household education level is also found to be generally inverse. Because, households having a mean education of more than the "diploma" level are comprised of an average only 4.0 persons. The association between house type and household education level is also found to be greatly associated because, 67 percent of squatter houses are occupied by the households those having a mean education level of junior school or less. However, the study has already mentioned that the poverty line monthly income for urban households in Kuala Lumpur City is RM675. Considering this income level for the squatter households the linkages between poverty and household waste management systems have been summarized under the following headings: (i) Householders "Knowledge" Regarding Solid Waste Management, (ii) Householders "Behavior" Concerning Solid Waste Management and, (iii) Householders "Attitudes" Toward Solid Waste Management.

9.2 Householders "Knowledge" Regarding Solid Waste Management

Studies indicate that almost all of households of Kg Dato' Harun area know that household waste collection services are provided in their living areas. This area is serviced by a private waste contractor and 71 percent of households there know this to be true. But, as many as 26 percent households believe that Local Town Authority (MPPJ) provides their waste collection services. Forty-three percent of households in the area also know that household waste collection services are provided three times per week while as many as 30 percent of households indicate that waste pick-up is not according to schedule. In Kg Dato' Harun, 64 percent of households report having met or heard about "itinerant buyers" of waste materials for recycling or reuse in their residential areas. Besides, only 19 percent of households report having met or heard about "waste scavengers" (private waste collectors 'on foot') in their residential areas. Most common materials scavenged are newspapers (19%), aluminum cans (15%), iron/metal (13%), and batteries (10%). Eighteen percent of households report having heard about "source-reduction" of waste. The percentages of households who have heard about "source-reduction" of waste are found directly to be related to household education level with the percentage of households hearing about "source-reduction" of waste for 68 percent for high school or above education level. So far, the most common sources of information about "source-reduction" of waste in Kg Dato' Harun are television, people's association and newspapers are a significantly less important information source. So the important association between the level of education and

newspapers reading is found to be greatly associated and thus, poor households are not able to gather adequate knowledge about "source-reduction".

9.3 Householders "Behavior" Concerning Solid Waste Management

Although, the differences in waste generation among households, among monthly household income groups, among household education levels are not significant but, the most common method for disposing household waste differs significantly among households. However, the use of "own dust-bins" is least common in Kg Dato' Harun with 44 percent of households dispose waste using such method. Besides, as few as one-third of households in the area dispose of waste in plastic bags placed at kerbside. Forty-six percent householders in the area place their waste at kerbside on the day it is generated and 37 percent householders store their waste for 1-2 days before placing it outside for collection. So, the link between placing waste at kerbside the same day as the waste is generated and monthly household income is found generally to be inverse and greatly significant. Forty-six percent of households having income less than RM1000, placing their waste at kerbside on the same day generated. Moreover, the link between placing waste at kerbside the same day as the waste is generated and household education level is found to be inverse and generally significant. For the high school or less education level, 53 percent of households placing waste at kerbside on the same day generated. Only 10.3 percent households in Kg Dato' Harun have tried to "source-reduce" wastes. None of households with primary schooling or less "source-reduce" wastes. So the link between taking steps to "source-reduce" wastes and household education level is direct and greatly significant. The link between reusing wastes that otherwise would be disposed and monthly household income is generally inverse and greatly significant as 92.3 percent of households with monthly income RM1000 or less are reusing waste in Kg Dato' Harun. So reusing waste materials is the common method for "source-reduction" among the households those are categorized as lower earners group. In terms of household waste conditions in their residential area, 23.3 percent of households are dissatisfied and only a very limited number of households reported this information to the Local Town Authority.

9.4 Householders "Attitudes" Toward Solid Waste Management

Concerns with the local waste conditions, householders' attitudes towards different problems can be summarized over the following views those are most common in Kg Dato' Harun. Householders' those are either "dissatisfied" or "very dissatisfied" with local waste conditions, the problem of greatest relative importance is "time of waste collection not fixed". Next in order of importance are (i) "waste collectors don't collect all the waste", (ii) "too infrequent waste collection", (iii) "drainage cleaning services not good", (iv) "no way to dispose bulky waste", and (v) "mosquitoes and flies are attracted to waste", with all the views significantly most common in the area. Differences in householders' views on local waste conditions neither differ significantly among monthly household income groups nor among household education levels. Although, householders' concerns with the implications of waste to human health differ significantly among monthly household income groups and among household education levels but, the degree of concern being greatest in the area. For example, more than 70 percent of households in Kg Dato' Harun area are concerned that conditions surrounding waste are harmful to human health. Most householders are also

concerned with possible harm to workers who handle waste, and/or the spread of communicable diseases resulting from human contact with open accumulations of wastes in public places. So the linkages between householders being concerned over health implications of waste and both monthly household income and household education level are generally inverse and greatly significant. These findings imply that waste conditions are worse in the areas, and/or residents with low income groups and/or low-level of education holders are more aware of and sensitive to adverse health implications from improperly managed waste. In terms of recycling, studies also revealed that the most common reasons for householders' recycling are to "protect the environment" and to "protect human health". Although the relative importance of both reasons differs significantly among different income groups but the overall investigation found it least important in Kg Dato' Harun. These findings imply that the link between reasons for householders not recycling and monthly household income and/or householders level of education is generally inverse and greatly significant. In other words, the lower level of income groups and/or education holders the higher the level of non-recycles householders.

10. CONCLUSION AND POLICY RECOMMENDATIONS

This study has shown various linkages and interrelations between poverty and environmental degradation more emphasizing on household waste management systems among the squatters in Kg Dato' Harun of Petaling Jaya Municipality. Although, the policy recommendations generated from this study could apply directly among the squatters' households of Petaling Jaya Municipality, they could also be extended to other municipalities in the country as well as other squatter areas of developing cities. However, the recommendations can also be useful to policy and decision-makers of appropriate authority in their efforts to alleviate poverty and improve environmental quality among the lower income groups of communities in Malaysia. In identifying the linkages between poverty and environmental degradation the study has examined householders' knowledge, attitudes, and behavior concerning solid waste management on the basis of their socioeconomic condition, level of income, level of education, and other attitudinal and behavioral variables. The most important factors affecting householder's knowledge, attitude and behavior are the level of income, level of education, type of environmental management systems, and other conditioning variables. However, in the short-run, alleviating poverty will not necessarily improve the environment nor will improving the environment necessarily alleviate poverty. In fact, policy should be aimed at affecting householder's knowledge, attitudes, and behavior with the aim of helping poor households to attain their amenities and basic needs. For example, lack of environmental awareness is a very important factor in the process of environmental degradation. This situation needs to be tackled, particularly among the communities where literacy levels are low and many people live in marginal economic circumstances. Both formal and non-formal methods of education should be adopted through means such as local media, seminars, celebrations, workshops, walks, and other educational competitions. Improving the level of education may increase the awareness and knowledge of environmental risks and hazards among households that could improve the quality in their households waste management as well as other environmental management systems. In this regard, television, newspapers, and people's associations can also play an important role for increasing people's awareness and knowledge through providing necessary informations about adequate environmental management systems. Besides these, policies for sustainable urban growth need to be

adopted which are able to view each urban environmental problem as it relates to all other urban issues thereby creating a habitat which makes city living attractive to all groups. The study showed that the root problem of squatting in urban areas is rural-urban migration, which eventually creates the problem of urban poverty as well as environmental degradations among the squatters. It can be recommended that reducing the number of urban poor can minimize the environmental degradations among the squatters. Slowing down or reversing the acceleration of rural-urban migration, however, would reduce the problem of urban poverty. To pursue the above policy, recommendation can be forwarded for the creation of more economic opportunities in the rural area as well as the Industrialization of the rural economy that is also highly required for achieving sustainable development as well. Moreover, the rural areas have to be provided with the physical infrastructure and fiscal incentives to attract industries there so that rural population will not have to migrate to seek employment in industries in the urban centers.

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