

Health Care and Infrastructure in Accra, Ghana

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Introduction

Ghana, located in West Africa, was the first of the colonized countries in Africa to declare its independence. Accra is Ghana's capital city, and serves as the geographic and economic gateway to this region. The city's diverse economy is home to both local and regional traders as well as many international companies.

Since its independence, Accra's population has increased rapidly. In 1957, the city had a population of approximately 190,000 (Grant & Yankson, 2003); today, the city's population is estimated to be over three million (Millennium Cities Initiative website). Accra experienced a period of rapid spatial expansion in the 1980s, and has been urbanizing rapidly ever since. Much of the city's growth has not been planned, and as a result, Accra's spatial expansion in recent years has occurred in some of the poorest areas of the city. This unfettered and unplanned growth has had severe implications for the population of Accra, and is most pronounced in the lack of basic urban infrastructure, including water and sanitation, transportation, education and health care in many parts of the city.

In January 2010, Accra partnered with the Millennium Cities Initiative (MCI) to become a "Millennium City." MCI works with underserved urban areas in sub-Saharan Africa to help them eradicate extreme poverty and to attain the Millennium Development Goals (MDGs) (MCI website). To fully realize a city's social and economic potential, needs assessments are conducted in many areas, including education, gender, water and sanitation, health and opportunities for economic development and foreign direct investment. All of the components of the above-mentioned needs assessments combine to provide a holistic understanding of the challenges a Millennium City faces and the investment opportunities that are required in order to achieve the MDGs.

This paper explores the health care system infrastructure in Accra by examining public health needs and addressing the challenges and goals identified by the Accra Metropolitan Assembly (AMA) Metro Health Services and Public Health Directorates. This paper also proposes recommendations for future research.

Framework for Health Assessment

In this paper, Accra's health systems and needs are analyzed in terms of the three health-related MDGs and the challenges identified by the AMA Metro Health Services and the AMA Metro Public Health Department. The following chart lists the health-related MDGs and the corresponding indicators used to measure the progress against each goal:

Goal	Indicator
MDG 4 - Reduce child mortality	4.1. Under-five mortality rate
	4.2. Infant mortality rate
	4.3. Percentage of 1-year-old children immunized against measles
MDG 5 - Improve maternal health	5.1. Maternal mortality ratio
	5.2. Percentage of births attended by skilled health personnel
MDG 6 - Combat HIV/AIDS, malaria and other diseases	6.1. Percentage of current users of contraception who are using condoms
	6.2.A. Condom use at last high-risk sex
	6.2.B. Percentage of population aged 15-24 years with comprehensive correct knowledge of HIV/AIDS
	6.2.C. Contraceptive prevalence rate
	6.3.A. Percentage of population in malaria-risk areas using effective malaria prevention and treatment measures
	6.3.B. Percentage of children under five sleeping under Insecticide Treated Nets (ITNs)
	6.3.C. Percentage of children under five who are appropriately treated

In a recent presentation, AMA Metro Health Services identified essential health-related challenges and needs for Accra. The directorate named challenges in two primary areas: physical health structures and issues related to adequate staffing and data reporting. According to AMA Metro Health Services, Accra faces the challenges of inadequate emergency care, infrastructure and equipment, and a lack of office and residential accommodations for health professionals. There are critical physical challenges at the hospitals themselves, and many units lack an adequate number of beds and specialty services. In addition, AMA Metro Health Services highlighted the severely low number of experienced health professionals in the city: the doctor to patient ratio is 1:12,000 and the nurse to patient ratio is 1:1,837. Finally, data collection and surveillance are weak.

In another presentation, AMA Metro Public Health Department emphasized Accra's health challenges from a population perspective. First, the department identified health issues related to environmental protection, which included noise nuisance, malaria control and pollution. The second critical health issue to be addressed was human waste disposal. The AMA Metro Public

Health Directorate reported that 70% of Accra's residents do not have access to toilets or sanitary latrines, leading to defecation in many public areas including beaches and drains. This is a particular challenge in areas where there has not been adequate urban planning. Finally, issues related to food and water safety are also of concern to the AMA Metro Public Health Department.

The gaps in achieving the MDGs and challenges listed by the AMA Metro Health Services and Metro Public Health Department underscore the public health challenges that residents of Accra face, and each area of focus emphasizes challenges that compromise the health and well-being of the population. However, there appear to be frameworks for approaching public health problems. While the MDGs focus directly on reducing morbidity and mortality rates within a population, the AMA Metro Health Services approaches Accra's health challenges by addressing issues related to the health system's physical and resource infrastructure. The AMA Metro Public Health Department looks at broader, urban-related factors and how such challenges influence the health of the entire city's population. All three perspectives articulate important ways to improve the health conditions of Accra, but each evaluates and addresses the city's health challenges using a different methodology.

Structure of Health Care in Ghana

Two governmental bodies oversee health care infrastructure and delivery in Ghana – the Ministry of Health (MOH) and Ghana Health Services (GHS). Until 1996, the MOH oversaw the direct provision of health service delivery in Ghana. Today, health service delivery is provided by GHS. The goal of MOH is, “to improve the health status of all people living in Ghana through effective and efficient policy formulation, resource mobilization, monitoring and regulation of delivery of health care by different health agencies” (www.moh-ghana.org). MOH works on policy formation, the monitoring and evaluation of health service delivery throughout the country, resource allocation for health services and the regulation of health services delivery. MOH also develops the framework for the regulations of food, drugs and health service delivery.

The following organizations are under the oversight of MOH:

- Ghana Health Services
- Korle-Bu Teaching Hospital (located in Accra)
- OkomfoAnokye Teaching Hospital (located in Kumasi)
- Christian Health Association of Ghana
- Ghana Ambulance Service
- Ghana Medical and Dental Council
- The Pharmacy Council
- Ghana Registered Nurses and Midwives Council
- Traditional and Alternative Medicine Council

MOH includes the following directorates:

- Policy, Planning, Monitoring and Evaluation (PPME)
- Research, Statistics and Information Management (RSIM)
- Human Resource Development and Management (HRDM)
- Administration (Admin)
- Procurement and Supplies (P&S)
- Traditional and Alternative Medicine (TAM)
- Finance (FIN)

With the passing of Act 525, the responsibilities of health service delivery were consolidated within GHS. According to MOH, there was not a great deal of actual separation of service provision, and in order to fully carry out the Ministry’s duty of policy formation and regulation oversight, there was a need to rethink the role of MOH in Ghana’s health care delivery system (www.moh-ghana.org).

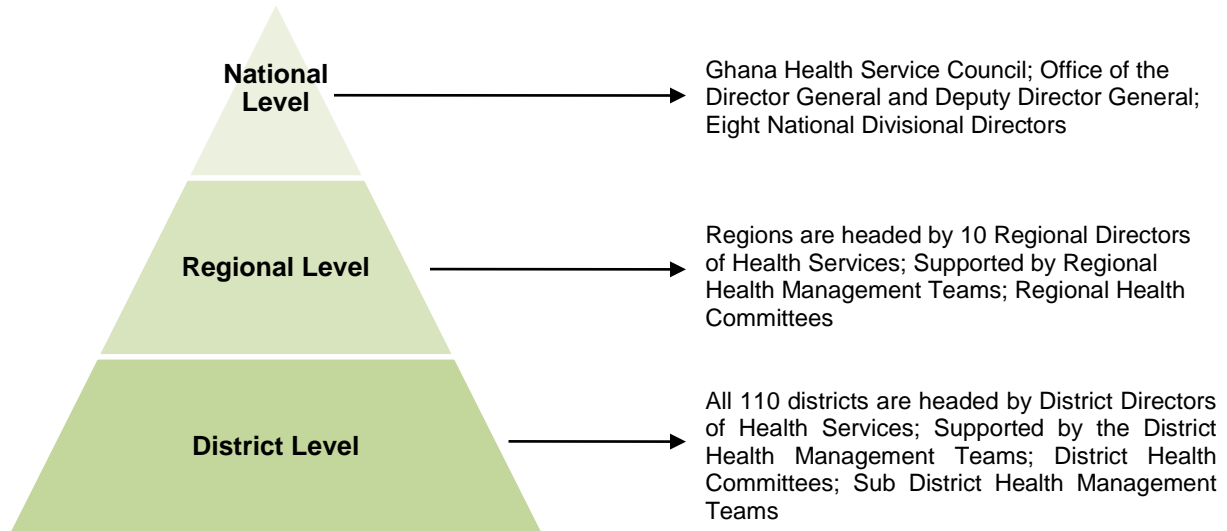
The second governmental body that works with health care in Ghana is GHS, an “autonomous Executive Agency responsible for implementation of national policies under the control of the Minister for Health through its governing Council - the Ghana Health Service Council. The GHS “continues to receive public funds and thus remains within the public sector” (Ghana Health Services website). This organization is the service provision arm of the health care system in the country, and works to implement national health care policies, provide health care services and manage resources for health care delivery. The functions of GHS include:

- Developing strategies and technical guidelines to achieve national policy goals and objectives
- Undertaking management and administration of health resources within GHS
- Promoting healthy living and habits among residents
- Establishing effective disease surveillance, prevention and control
- Determining charges for health services (contingent on approval from MOH)

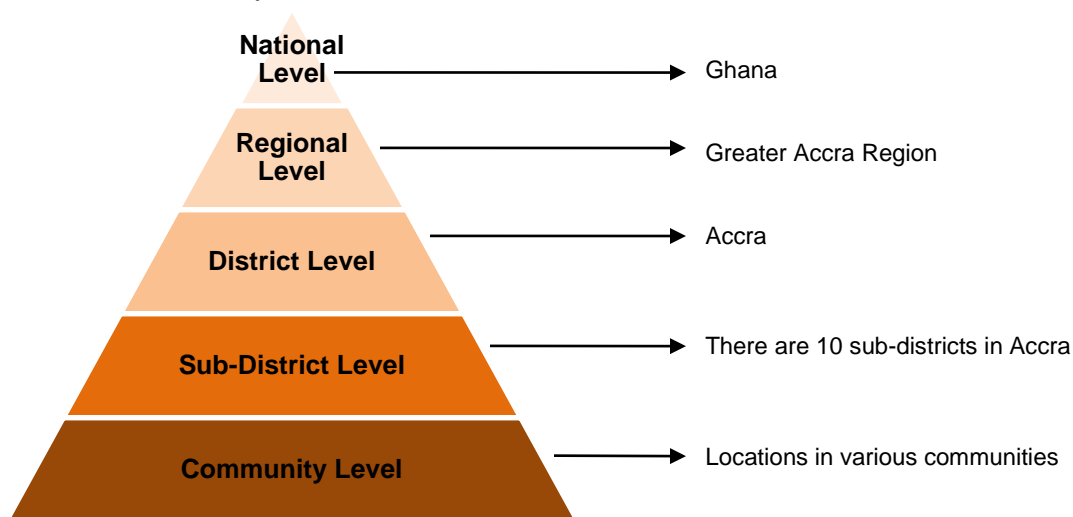
- Providing in-service training and continuing education
- Performing any other functions relevant to promotion, protection and restoration of health

There are three administrative levels of GHS and five functional (service distribution) levels of health care in Ghana.

Administrative Levels of GHS



Functional Levels of Health Care Service Distribution in Ghana



Accra is divided into 10 administrative health sub-districts, which include: Accra Metro, Ledokuku-Krowor Municipality, Tema Municipality, Ashiaman Municipality, Adenta Municipality, Ga West District, Ga South District, Ga East District, Dangme West District and

Dangme East District (Greater Accra Region Annual Report, 2008). The urban makeup of these ten different districts varies greatly. Putting this in perspective, Tema Municipality has approximately 500,000 people and a government hospital, three health centers and many private hospitals and clinics. Ga West District, which used to include Ga South, used to be a primarily rural area, but rapid urbanization has led to an area population of more than 400,000. The Amasaman District Hospital is located in Ga West (Greater Accra Region Annual Report, 2008), and has six Community Health Based Planning and Services (CHPS) zones, two health centers and a clinic. Similar to Ga West, Ga East used to be a rural area, but due to rapid urbanization in Accra, the district's population is greater than 250,000 people. GHS lists one functional CHPS compound, three health centers and a mother-child health clinic in the district, and the Greater Accra Region Annual Report lists a mission clinic and a quasi-governmental clinic in the district (Greater Accra Region Annual Report, 2008). Dangme West and Dangme East Districts, which used to be one district, are now two rural areas where poverty is prevalent.

Health Infrastructure in Accra

The city of Accra has approximately 20 government-run health facilities, which include:

- Three Hospitals (Achimota Hospital; Princess Marie Louise Children's Hospital; La General Hospital);
- Six Polyclinics;
- Three Quasi-Governmental Facilities;
- Ten Smaller Clinics;
- Two CHPS Compounds;
- More than 800 private health facilities.

There is supposed to be one polyclinic in each sub-metro area, but currently this is not the case. This shortage of polyclinics may be due to the recent sub-division of four districts into ten new sub-metro areas.

GHS runs three national programs: The Tuberculosis (TB) Control Programme, the National Buruli Ulcer Control Programme and the Expanded Programme on Immunization (EPI). TB is a major health challenge in Ghana (Ghana DHS, 2008), and the TB Control program began in 1994 to address this infectious disease in the country. In 1994, the country also adopted the Direct Observation Treatment Short Course (DOTS) strategy for controlling TB in Ghana. The

National TB Programme has achieved 100% DOTS coverage, and is now implementing the World Health Organization's (WHO) Stop TB Strategy, which includes:

- Pursuing high-quality DOTS expansion and enhancement
- Addressing TB/HIV, MDR-TB and other challenges
- Contributing to health system strengthening
- Engaging all care providers
- Empowering people with TB, and communities
- Enabling and promoting research

A Buruli ulcer is a skin disease that causes large ulcers, mainly on the skin and arms. They can damage soft tissue and lead to limited functions of joints. It is a treatable disease, and early intervention can prevent the more severe skin and joint damage (Ghana Health Services website). The National Buruli Ulcer Control Programme provides over 30 sites for treatment in six different regions in Ghana. WHO standards guide this program, including:

- Early case detection and treatment
- Capacity development
- Strengthening of health facilities
- Rehabilitation of the affected victims
- Research activities
- Advocacy

Finally, EPI is the program used to immunize pregnant women and children against preventable diseases, including tuberculosis, polio, diphtheria, neonatal tetanus, whooping cough, hepatitis B, haemophilus influenza type B, measles and yellow fever (Ghana Health Services website). EPI coverage is addressed in the following section.

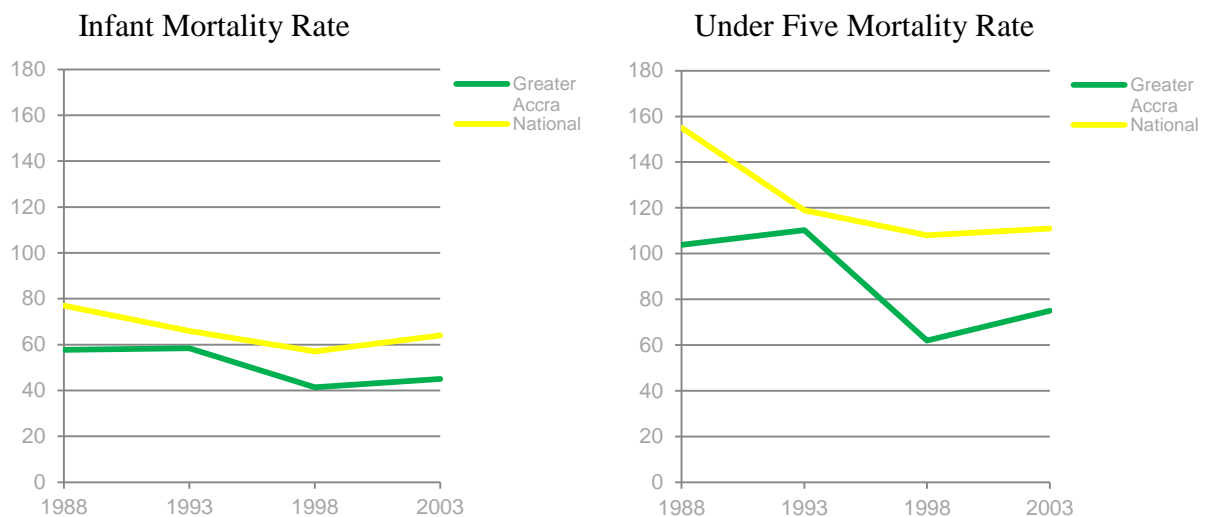
Health Concerns for Accra Residents

MDG 4: Reduce Child Mortality

Rapid urban growth can greatly affect a population's health. Children in particular are susceptible to the ancillary effects that unplanned urban growth can have on a community's health. This section addresses issues related to child health, including antenatal care, infant mortality rate, child (under five) mortality rate, immunization coverage and nutrition.

Antenatal care is an important variable in child health. The WHO recommends four antenatal visits for pregnant women. The Greater Accra Annual Report addresses the percentage of women per sub-metro who are accessing antenatal care, and the results vary greatly across the ten sub-metro districts. For example, Adenta has a 3% antenatal coverage, while Tema has 124% coverage. The report attributes this high degree of variability in part to pregnant women who live in one district and register in another or register at more than one clinic for care (Greater Accra Region Annual Report, 2008).

Another report cited in this paper, Ghana Facts and Figures (2008), notes the infant and child (under five years of age) mortality rates for Accra.

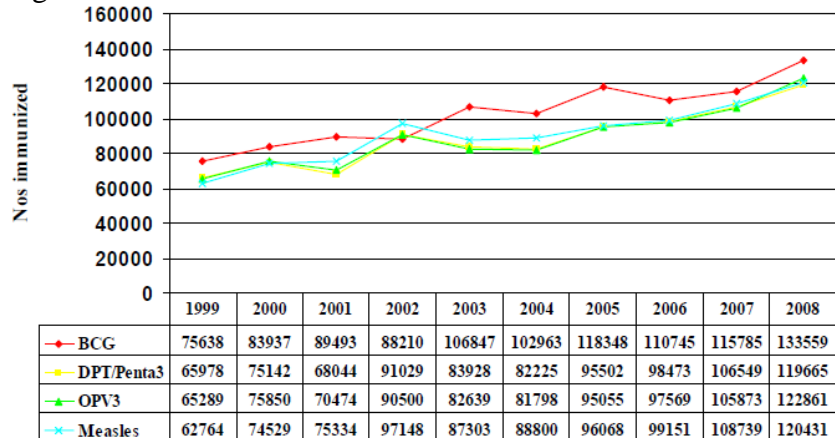


Source: Data from Ghana Facts and Figures, 2008

The Ghana Demographic and Health Survey (2008) also demonstrates that the rate of child mortality has decreased in the country over the past 20 years. The rate of child mortality is 80/1,000. Similarly, the infant mortality rate in Ghana is 50/1,000.

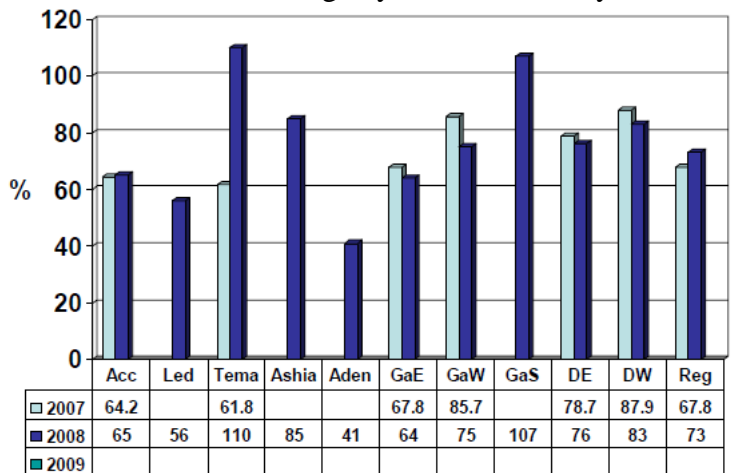
There are varying levels of immunization coverage among children in Accra. There have been upward trends in child immunizations overall since 1999, with 80% of children in Accra receiving the Penta 3 vaccinations.

Figure 1. Trends in Total Numbers of Children Immunized



Source: Reproduced from Greater Accra Region Annual Report, 2008

Figure 2. Penta 3 Routine Coverage by District, January – December 2008



Source: Reproduced from Greater Accra Region Annual Report, 2008

A portion of the discrepancies in Figure 2 might be attributed to the sub-division of some of the sub-metro districts. However, adequate coverage and better surveillance of immunizations will help protect children against these treatable diseases and identify where any problem areas are located.

A child's nutrition is measured by three indices: height for age (stunting, standard deviations show chronic malnourishment); weight for height (wasting, standard deviations show acute malnourishment); and weight for age (underweight; takes chronic and acute malnourishment into account) (Ghana DHS, 2008). As compared with Ghana's other regions, Greater Accra has the lowest z-score of stunted children (-0.6 standard deviations from the mean); a low z-score of

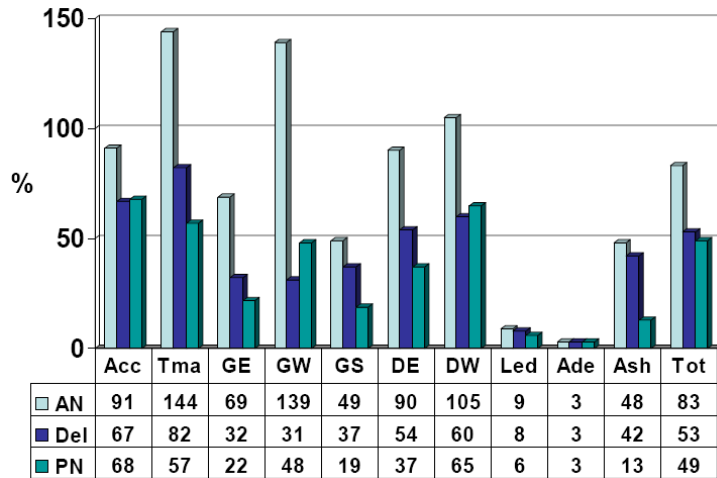
wasted children (-0.1 standard deviations from the mean); and the lowest z-score of underweight children (-0.4 standard deviations from the mean) (Ghana DHS, 2008). This data show that fewer children in Greater Accra suffer from malnutrition, as compared to children in other parts of the country. However, these data do not account for variations that might be present within the population.

MDG 5: Improve Maternal Health

Maternal health care is a serious health issue in many parts of sub-Saharan Africa. Maternal morbidity and mortality are often related to complications during and after child birth. Many of the health complications women face during child birth could be prevented with better access to skilled health care professionals during labor (World Health Organization). In Ghana, 57% of women deliver in health care facilities, which is an improvement from 46% in 2003. Urban areas tend to have a higher rate of deliveries occurring in health care facilities. In Accra, 53% of births were supervised, and an additional 3% were attended by traditional birth attendants (Greater Accra Region Annual Report, 2008).

The Annual Report notes that this aggregate rate of supervised delivery in Accra masks the variation of coverage among the various sub-metro districts in the city. It also notes that there is significant variation in which facilities women seek out when they choose to deliver in a health care facility. For example, health care facilities that offer emergency obstetric care tend to be overcrowded, and smaller maternity clinics are often underutilized. This variability can compromise a facility's ability to provide the type of care that women may be seeking. The 2008 Annual Report states that there are efforts underway to expand the capacity of facilities that provide emergency obstetric care as well as to build or expand facilities to provide emergency obstetric care in peripheral health facilities.

Figure 3. Reproductive Service Coverage by District (2008)



Source: Reproduced from Greater Accra Region Annual Report, 2008

The 2005 maternal mortality rate in Ghana is 503/100,000 live births (Ghana DHS, 2008). Estimates for maternal mortality in Accra are much lower than the country’s national average, ranging from 169/100,000 (Greater Accra Region Annual Report, 2008) to 202.3/100,000 (GHS Facts and Figures, 2008). According to the MDG-Ghana report published in 2006, evaluators could not determine the progress of the country on MDG 5, and noted that the “state of supportive environment” was fair (Ghana MDG Report, 2006).

Family Planning is also an important contributor to maternal health. According to one report, more than 98% of the population has knowledge of some type of contraceptive method (Ghana DHS, 2008). Male condoms are the most commonly cited method throughout the country, followed by the female condom and the pill. Nationally, 50% of women report having used a method of contraception at some point in their lives (Ghana DHS, 2008).

The Greater Accra Annual Report does not cite the number of people who know of and use contraceptive methods. In the second-largest city in Ghana (Kumasi), only 10% of women in fertility age (ages 15-45) use contraception (Kumasi Metro Health Directorate Annual Report, 2007). This has decreased to 7.2% in 2008 (Annual Performance Review 2009, Kumasi Metro). In Kumasi, the most commonly-used family planning method is the injectable, followed by intra-uterine devices (IUDs), condoms and oral pills (Kumasi Metro Health Directorate Annual Report, 2007). The rates of knowledge about contraception and usage of family planning

methods in Kumasi are much lower than the national average, so it is difficult to infer knowledge of contraception and usage of family planning methods among Accra residents.

MDG 6: Combat HIV/AIDS, Malaria, and Other Communicable Diseases

HIV/AIDS

Ghana has a relatively low HIV prevalence rate with 7.4% of the national morbidity rate and 5% of under-five deaths due to HIV/AIDS related conditions (GHS Facts and Figures, 2008).

Among people ages 15-24, the prevalence of HIV/AIDS has decreased from 3.2% in 2002 to 1.9% in 2008 and among clients in antenatal clinics the HIV prevalence in 2008 is 2.2%. One facility where surveillance of HIV prevalence is often conducted is at antenatal clinics. In Accra, the HIV prevalence rate for women at antenatal clinics was 3.4%.

Four sub-metro districts, Accra, Tema, Dangme East and Dangme West, house the 17 sites in Accra where anti-retroviral therapy (ART) is available. GHS in the Greater Accra Region includes four main interventions to address HIV/AIDS in the city (Greater Accra Region Annual Report, 2008):

- (1) Health education and community partnership
- (2) Improving access to voluntary counseling and testing centers
- (3) Preventing mother-to-child transmission
- (4) Improving access to ART

Tuberculosis

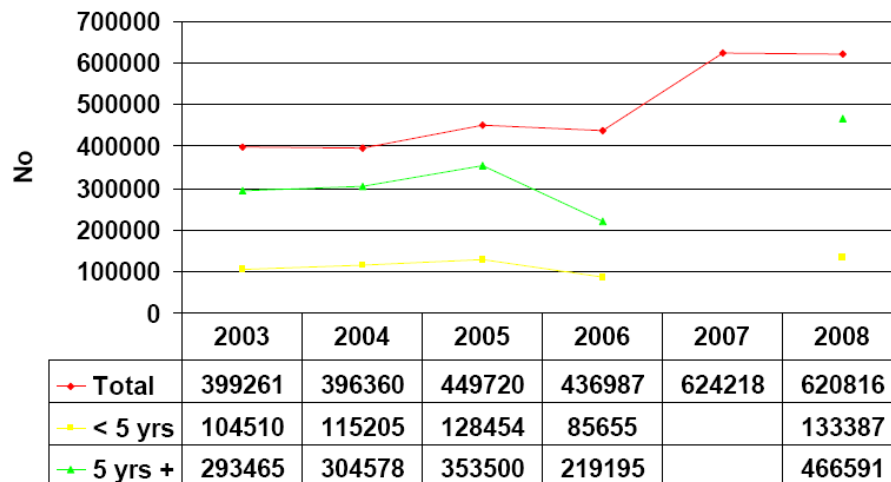
In 2004, there were an estimated 44,733 new cases of TB throughout Ghana, and the numbers of reported cases were over 10,000 in 1999 and over 12,000 in 2005. Between 60-70% of TB cases occur in people ages 15-45, which is the most productive age group in the country. Of note, this is also the age group at the highest risk of contracting HIV (GHS Technical Policies for TB/HIV, 2006).

Finally, there is a high rate of coverage in Accra for the Bacille-Calmette-Guerin vaccine (Ghana DHS, 2008) which prevents TB (CDC website).

Malaria

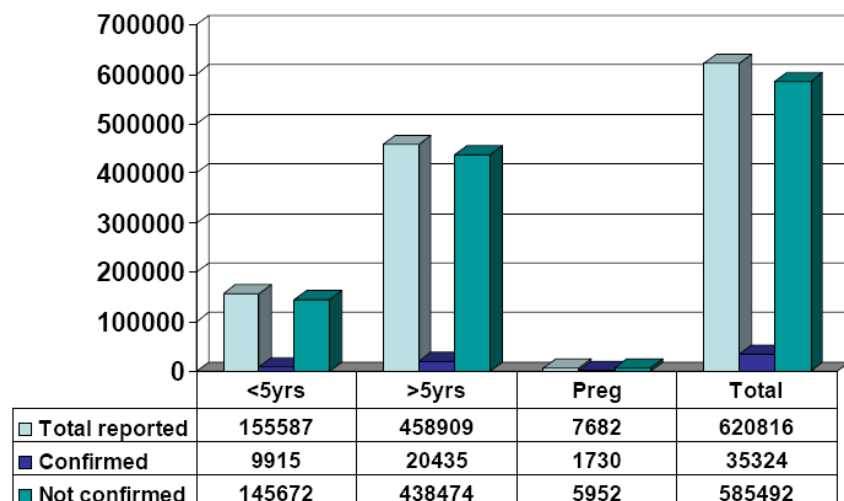
Malaria is endemic in the entire country of Ghana (please refer to Appendix A), and is a major cause of death in pregnant women and children under five (Ghana DHS, 2008). Nationally, there are more than three million suspected cases of malaria, which account for 30-40% of outpatient treatment (Ghana DHS, 2008). In Accra, there were over 620,000 reported malaria cases; yet only 5.7% of the cases were confirmed. This is attributed to most reported fevers being treated as malaria. This greatly skews the data on malaria, and results in a high amount of medication being distributed to unconfirmed malaria cases.

Figure 4. Reported Malaria Cases in Accra



Source: Reproduced from Greater Accra Region Annual Report, 2008

Figure 5. Reported versus Confirmed Malaria Cases in Greater Accra Area



Source: Reproduced from Greater Accra Region Annual Report, 2008

The AMA Metro Public Health Department looks at malaria from an environmental perspective. This department reports that it is the “highest cause of OPD [attendance] in health facilities, the highest cause of death among children under five and pregnant women, and takes the highest ‘chunk’ of the Ministry of Health’s budget” (AMA Public Health presentation). The AMA Metro Public Health Department states that an increased number of trained professionals, mosquito nets and expanded malaria control are required to better support the department’s efforts (AMA Public Health presentation).

One way to reduce the risk of contracting malaria is to sleep under insecticide-treated nets (ITNs). GHS supplies subsidized bed nets to people through child welfare and antenatal clinics, and sometimes MOH distributes free ITNs (Ghana DHS, 2008). The number of children under five sleeping under ITNs was not available, but is an important indicator for monitoring malaria incidence and prevalence in Accra.

GHS in the Great Accra region highlights six main priorities for managing malaria in the area. This includes making INTs available to households in most districts and sub-metros that have children under five years of age. Public education is also an important aspect of malaria control, so that people know the importance of ensuring that their children sleep under ITNs. Surveillance of ITN availability and use by pregnant women is another priority intervention for

malaria control. There are also efforts to support the use of chloroquine as the first-line treatment as opposed to artesunate-amodiaquine. Finally, emphasis is placed on better malaria case management (Greater Accra Region Annual Report, 2008).

Health and the Built Environment

The rapid urbanization that Accra has experienced since the 1980s has led to unplanned urban growth, in which necessary development of urban infrastructure lags behind. The AMA Metro Public Health Department describes malaria as a major health-related environmental consequence of standing water. It also identifies environmental damage resulting from poor or absent sanitation measures and the incidence of people burning rubbish. In addition to environmental pollution, this damage has led to an increase in respiratory infections. Finally, the lack of toilets and sanitary latrines for the majority of Accra's population results in people defecating wherever available (AMA Metro Public Health Department presentation). Lack of appropriate and hygienic latrines and toilets can result in the spread of disease, food and water contamination and unpleasant built environments.



Images from AMA Metro Public Health Department presentation

Poor water and sanitation infrastructure can lead to the spread of disease. One of the major health problems related to inadequate accessibility of water and sanitation is diarrhea, a treatable disease which is frequently associated with child morbidity and mortality in Ghana. In the Greater Accra Region, 12.4% of children under five had diarrhea in the two weeks preceding the

survey, and none reported having severe diarrhea, identified by blood in the stool(Ghana DHS, 2008).

Another major challenge that influences the health of Accra's residents is transportation. The extreme congestion on Accra's roads prevents people from accessing health care, which can be a particularly severe problem for people who are in need of emergency medical care. While it appears that studies have not yet been conducted, the pollution that can result from the large number of vehicles on the road can have serious health and respiratory consequences on Accra's residents.

Recommendations for Future Surveillance and Research

Inhabitants of Accra face many types of health challenges, ranging from those associated with clean water and sanitation to accessing emergency obstetric care. Many of the issues are preventable or can be addressed with interventions that are already in place but may need to be altered in order to maximize effectiveness. Serious challenges arise from the low number of health care professionals working in Accra, and it appears that the hospitals and clinics that exist are in dire need of repair and expansion. Additionally, many of the health challenges in Accra stem from systemic problems faced by the city as a whole— including poor access to and delivery of potable water and adequate sanitation, the extreme difficulty of efficiently navigating roads and the unalterable fact that the city is located in a malaria-endemic region.

The AMA Metro Health Service and Public Health Department emphasize the need to improve structural components of health care service provision. This is an important factor for providing better outreach to and care for city residents. However, focusing the entire directorate program on structural components might overlook other interventions required to reduce incidence and prevalence of diseases. This focus might also prevent the AMA Metro Health Service and Public Health Department from identifying alternative, and perhaps more cost-effective, ways to improve the city's health. The following table lists the health policy priorities of the AMA Metro Health Services on the left and potential interventions on the right. The suggested interventions propose alternative ways to address the health care needs of Accra's inhabitants.

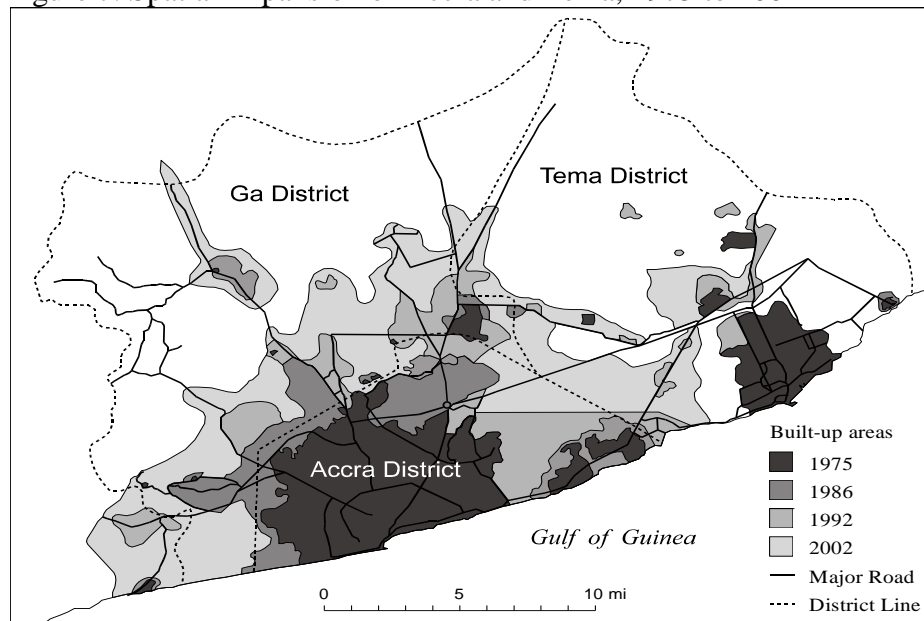
Figure 6. Potential Interventions for AMA Metro Health Service Policy Priorities

Health Policy Priorities (AMA – Metro Health Service):	Potential Interventions
Increase access to health care	Prevention of communicable and non-communicable diseases; increase number of community health care workers
Improve quality of care	Increase training of health care workers, particularly nurses, community health workers, and TBAs
Enhance efficiency	Incentives to physicians and nurses to stay and work in Accra
Foster collaboration and partnerships	Working with universities; increase number of community health based planning and services (CHPS zones and areas)
Improving funding resources, distribution, and utilization	Improve NHIS reimbursement rates
Bridge inequalities in access to quality health care	This is the ultimate goal in health policy and management, disease prevention, and health care service delivery

AMA Metro Health Service is correct to identify the needs of the city’s health care infrastructure. However, institutional goals of service delivery, immunization coverage, antenatal and postnatal care, family planning and education about infectious diseases such as HIV/AIDS and TB would make for a more comprehensive and overall holistic outlook that encompasses a higher percentage of Accra’s health needs.

Being aware of the overall health care infrastructure of Accra helps provide an understanding of the general health of the city. However, aggregate city-level data prevents researchers, health personnel, government officials and community members from analyzing trends in the health of a specific community. The different sub-metros of Accra have varying levels of infrastructure accessibility, service provision and health needs. For example, some areas of the Greater Accra metropolitan region have experienced rapid growth over the past 20 years, both in terms of population increase and spatial expansion of the built environment. This is the case in Ga West and Ga East Districts. Thirty years ago, the districts were sparsely populated; yet by 2005, Ga West had a population of 424,224 and Ga East had a population of 258,478 (GHS website). GHS states on its website, “[In Ga West and Ga East] the lack of health infrastructure is because urban growth has rapidly outstripped the infrastructure that used to be adequate for a sparsely populated rural district”. Future research can benefit by including studies that focus on areas where there have been dramatic changes in population growth or the built environment and by studying the health needs of distinct communities.

Figure 7. Spatial Expansion of Accra and Tema, 1975 to 2002



Source: Reproduced from R. Grant presentation to GSAPP, 6 April 2010

Conclusions

Accra is the gateway city to Western Africa. However, if the health challenges faced by the population are not addressed in a consistent and comprehensive manner, the population of the city will not be able to reach its full potential. The Millennium Development Goals highlight the need to reduce the population's morbidity and mortality rates, and focus its health-related interventions on accomplishing these goals. In comparison, the AMA Metro Health Services prioritize the need to invest in the city's health infrastructure, both physical and institutional, and increase the number of health professionals in Accra. Finally, the AMA Metro Public Health Department looks at environmental factors and their respective impact on population health. All of these approaches are critical to solving the health challenges present in Accra. A reframing of the health needs and challenges in Accra that incorporates a more holistic approach and evaluates smaller geographic areas in the city would benefit all stakeholders. It would also allow for a more nuanced understanding of the health needs of individual, unique communities in Accra and could ultimately result in a more inclusive approach to improving the health of Accra's general population.

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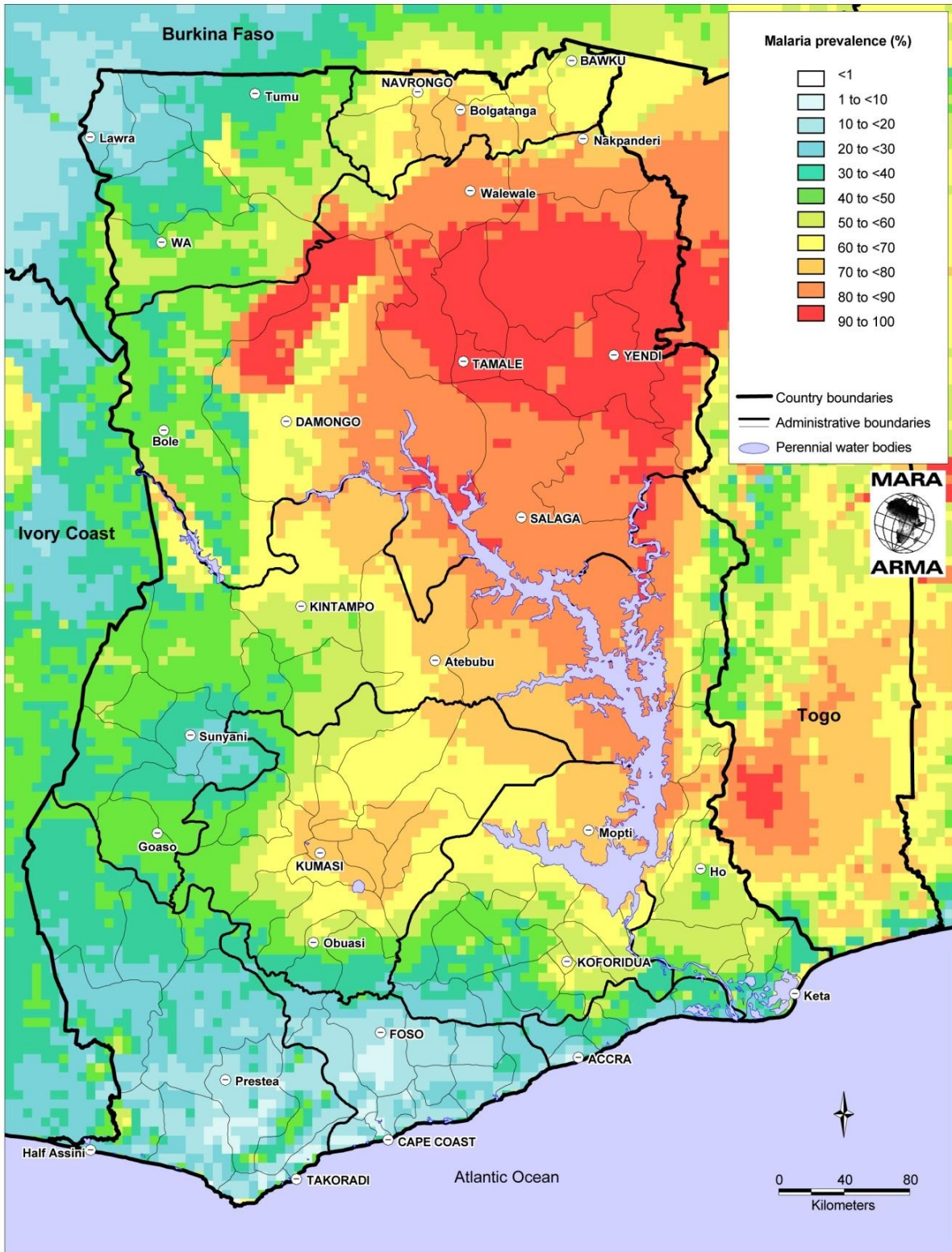
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Appendix A.

Ghana: Malaria Prevalence Model



Source: MARA/ARMA (2002)