"Urbanization and Human Health in Urban India: Institutional Analysis of Water-Borne Diseases in Ahmedabad"

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Abstract

Diseases are rapidly urbanizing. Ageing infrastructure, high levels of inequality, poor urban governance, rapidly growing economies, and highly dense and mobile populations all offer environments for water-borne diseases. These infectious diseases are systemic in nature and set within wider social, economic, and environmental contexts. Institutions are a cross-cutting element that mediates a myriad of factors. Taking a systems perspective, this paper analyzes the role of institutions in facilitating the breeding of water-borne diseases in the city of Ahmedabad, India. It applies 'path dependency' and a 'rational choice' perspective to understand the factors facilitating the breeding of diseases. This study conducted a household survey of approximately 327 households in two case study wards in the city. The two case studies present two different forms of institutional arrangements. The first settlement is ignored by the development authorities and is considered a 'slum' or a 'slum-like' settlement. The second settlement is planned and, due to various structural inefficiencies, has led to chaos in housing and water systems. Principle component analysis is applied to reduce the data and convert a set of observations, which potentially correlates with each other, into components. The analysis reveals the importance of religion, household vulnerability, access to good quality water, and the types of water sources available; all of these factors play a crucial role in breeding water-borne diseases. The institutional reasoning behind these components reveals that the structural inefficiencies affecting urban health are deeply rooted in a historical legacy, which has created opportunities for contemporary actors to exploit and sustain these inefficiencies, thereby creating a conducive environment for breeding water-borne diseases in the city. This has led to a vicious cycle, and breaking this cycle requires a systematic approach to carefully steward change and improve urban health.

Institutional Analysis and Health

Urban environments in developing worlds are increasingly offering suitable environments that trigger water- and vector-borne diseases (Alirol et al., 2011). Given the close proximity of the human environment, existing diseases are reestablishing themselves, new diseases are emerging and diseases once considered as rural have now established themselves in urban areas. Rapid economic growth, exponential increase in urban population, and widening health inequalities has forced many of the rapidly growing economies, such as India, Brazil, and China to focus on urban health. India introduced National Urban Health Mission in 2012 along the lines of the national rural health mission in 2005 (GoI, 2012) after prolonging it for decades (Dasgupta & Bisht, 2010). The mission aimed to provide free access to basic health-care facilities to urban poor. China's health reform (the Urban Resident Basic Health Insurance) in mid-2000 has remained focused on extending coverage and promotion of equitable access. Brazil established health as a right for all citizens under the Unified Health System (SUS) in 1988. The SUS was based on the principles of complex decentralized public system with community participation through the provision of universal, comprehensive, collective and individual health care. These health reforms have significantly reorganized and expanded the urban health care system, introduced public-private partnership in the delivery of services, and enhanced the health system governance in these rapidly growing economies. This is supported by the various initiatives to strengthen the surveillance and monitoring of the health status of the people, which is considered as a vital investment for the changing burden of diseases (Ebrahim, 2011). In spite of these efforts, universal health coverage, reducing the health inequality and disease burden has challenged many of these rapidly growing economies (Marten et al., 2014).

The paper applies institutional analysis to understand the transformation of health care in the city of Ahmedabad in India. It offers an institutional reasoning behind the multiple aspects of the water-borne diseases (WBDs). In specific, it evaluates the relevance of the recent reforms and their implications to improve urban health and reduce health inequalities in urban India. New institutional literature has provided insight into the functioning of institutions and their interaction in influencing health systems. In new institutional literature, historical

institutionalism and rational choice institutionalism have been applied to better understand health care reform. Having its roots in political science, historical institutionalism takes a path of dependency approach. From this school, Wilsford (1994) examines health care reforms in select countries to argue for the historical embeddedness of these reforms. Similarly, Bloom and Wolcott (2013) highlight the dominant role of history and its legacy of institutions on contemporary health systems. In specific, Grundy et al (2014) argue that path dependency offers insights on the durability and continuity of institutions and their related behaviors. Rational choice institutionalism, with its roots in new institutional economics, argues that actors are rational, self-interested individuals attempting to maximize their benefits and minimize their costs in the given institutional arrangement. They do not disregard path dependency but give primacy to the rational interest of individuals and communities. Therefore, health systems are seen as institutional arrangements that, through adequate incentives, can coordinate rational agents for improved health care (Bertone & Messen, 2012). The rational choice school understands health seeking behavior and explains public policies as solutions for the collective actions of rational individuals (Ovseiko, 2008). Scholars from the path dependency and rational choice institutionalism offered insights on the failure of key reforms, inadequacy of health care reforms, and capacity of health care systems. The above literatures have focused on health care reforms, with limited application to the diseases, in specific to WBDs. Myriad of factors influence the WBDs. Undernutrition (Bryce et al., 2005; Thapar & Sanderson, 2004); social factors (Zodpey et al., 1998); socio-economic status (Wijk-Sijbesma, 1998); demographic and location factors (Mukherjee, 1990; Nanan et al., 2003); lack of awareness and education (Goi, 2002); and individual and household hygiene practices (Oo et al., 2000; Jensen et al., 2004) are some of the few point out. However, it is rare for any single factor to act in isolation or on a single scale. These factors are bound by diverse institutions that binds these factors. An institutional reasoning behind these factors offer deeper understanding of the historical trajectories and its turning points (Grundy et al., 2014), behind the spread of diseases for developing appropriate interventions.

Methods and Analysis

WBDs depends on the health care services, and its relation to the urban infrastructures, such as water supply, sanitation and housing. This paper analyses the role of institutions in influencing WBDs in two administrative wards in the city of Ahmedabad, India: Ward A and Ward B. The city has a population of approximately 5.6 million and a projected increase is estimated to be approximately 7.5 million by 2021. In 2009-2010, the city was ranked 19th among other cities for having improved water supply and sanitation services (UMC, 2012). In spite of this coverage, water- and vector-borne diseases continue to persist and reoccur. The two case study wards, Ward A and Ward B, reports highest incidence of WBDs (Annexure.1), but represents two different forms of institutional arrangements. The urban development authorities shelved the former settlement, as it was considered a 'slum' or a 'slum-like' settlement, therefore deprived of any major public infrastructure investments. The latter settlement is planned and obtains major investment but nevertheless faces chaos in the housing and water systems, due to structural inefficiencies.

Ward A ward reported high incidences of jaundice (for 2010 and 2012) and malarial diseases (from 2010 to 2012) (Annexure 1). It is one of the settlements located in the city center having approximately 91,404 households according to the 2011 census. The ward was a thriving textile center during the pre-colonial and colonial periods, accommodating mainly low-caste Hindus and Muslims living in 'chawls'. The chawls are housing units owned by the textile mills which were rented out for the mill workers. The household survey reveals that this settlement is largely composed of chawls and informal settlements accounting for approximately 58% of the population. About 40% live in societies (these are group apartments), and the rest live in independent bungalows and houses. The Muslim population is currently larger (about 74%) than the Hindu in the ward (Table 1). About 53% of the total households live in pucca houses, and about 30% live in semi-pucca housing, and the remaining live in katchcha housing. Eighty-one percent of the houses have access to piped drinking water inside their houses, and 92% have access to toilet facilities in or near their houses.

Table 1
Profile of the Wards

Indicators	Ward A	Ward B
Total population (as of 2011)	91,404	86,346
Total households sampled	150	177
Total population covered	999	1089
Percentage of dependable members in the household (i.e., members below age 12 years and above age 60)	19	35
Religion		
Hindu	37	126
Muslim	111	29
Sikh	0	9
Christian	1	6
Others	1	7
Settlement Type		
Societies	62	51
Gujarat Housing Board	-	49
Chawls	31	19
Flats	-	34
Informal Settlements	57	24
Quality of Housing		
Pucca*	80	139
Semi-Pucca^	51	32
Katchcha°	19	6
Ownership of Housing		
Own house	123	164
Rented	24	11
Leased	3	2
Source of Water		
Piped water inside the house	122	117
Public taps/stand pipes	4	7
Other	24	2
Access to toilets		
Owns a toilet within or outside the house	138	168
Other types (Open defecation and public toilets)	12	9
Number of households reporting water stagnation	98	118

around the house (due to rain, water leakage, or poor drainage)		
Average percentage of household members educated beyond a secondary school education	17	35
Monthly average income (in Indian Rupees) of the household§	3,554.00	9,650.00
Average percentage of the household working as laborers	12	10
Average number of members sharing one room	4	4

* Pucca households: Houses made with high quality materials throughout, including the floor, roof, and exterior walls.
^ Houses that have solid walls constructed with high quality material, but the roofs are thatched with grass or asbestos or tiles.
° Houses made from mud, thatch, or other low-quality materials.
§ The exchange rate as on 1 USD = 57.90 Indian Rupees as on 15 October 2014.

In contrast, Ward B is a planned settlement that was developed in the 1970s to provide low cost housing to textile mill workers and employees back to the times when Ahmedabad was a flourishing textile center. These mill workers were largely Hindus. Some of the chawls, which were de-congested from the then city center, were relocated here. With the closure of the mills in the 1980s and 1990s, many people remained unemployed, sought self-employment, or were absorbed into the diamond-cutting industry that grew from the 1990s onward. The diamond industry and the growing economy of Ahmedabad further increased the population of the ward. Unfortunately, this population increase began to encroach on public amenities (i.e., sewage, drinking water, and storm water pipelines). To meet the growing demand, private real estate companies began to develop lands for independent bungalows, and apartments. In addition a number of informal settlements emerged to meet the growing housing demand encroaching public lands, especially around the late 1990s. As of 2011, the ward had a population of 86,346, approximately 70% of whom are living in informal settlements on public or private lands. More than 90% of households have access to drinking water and sanitation; however, water logging, aging infrastructure, poor pipeline alignment, encroachment on public amenities and illegal drinking water connections are creating chaos in this ward.

The study was carried out between January 2012 and July 2012 in the two wards. The analysis presented here is based on data from 150 households in Ward A and 177 households in Ward B. The eligibility criteria for the survey were based on the religion and economic backgrounds of the household members. The stratification was carried out through group discussions with 'link workers' and 'multiple health workers' in the ward. 'Link workers' are an army of health workers attached to the urban health centers in each ward. They regularly make door-to-door visits to about 1000 households in their jurisdiction to determine their health statuses. 'Multiple health worker' coordinated with about 5-6 link workers. The urban health centers (each in one ward) play a prominent role in delivery of health care services, and in surveillance and monitoring of diseases. Group discussions were conducted with 4-5 link workers who had extensive experience in the ward. To help frame the questionnaire for the survey, open-ended interviews were conducted with key informants in the ward to determine their history, their understanding of the diseases, and the reasons behind occurrences of these diseases. Prior to the conducting the interviews, the research team made two or three visits to the identified households to explain the study and to determine their willingness to be part of the study team. The study was conducted only after the household head or an adult member of the household approved and signed their willingness. This helped to build rapport and also helped the household members to think about their participation in the study. The investigators, along with link workers were trained to conduct the survey and were supervised by two of the study's authors. Using the local language, information on hygiene practices; land tenure status; health care strategies; family migration history; basic facilities in the households; personal or family characteristics (social factors, education level, economic status, and demographic factors); and health history (five years for chronic and six months for water- and vector-borne diseases) were collected through structured interviews with the head of the household or a knowledgeable person in the household. Data from the questionnaires were double entered after the case was closed, and plausibility was checked before the database was locked. All information was treated as confidential. For the analysis, households reporting incidences of WBDs during January to July 2012, and those not reporting diseases, were considered. The information was classified into the following categories: land tenure; economic status; environmental hygiene; social hygiene

practices; socio-demographic status; health status of the household; and access to water supply and sanitation.

A list of 36 variables was selected, which were converted to a dummy, scale, and ordinal forms for the principle component analysis (PCA). This helped to reduce the data and convert a set of observations, which potentially correlated with each other, into components. The components explained approximately 60% of the Eigen value and were used for a Poisson regression. Broadly, these components were interpreted as follows:

(i) Higher economic and educational standards (HEE): This component includes income, higher educational status of the household members (adults who studied beyond the tenth grade), and a lower percentage of members employed as daily wage earners. This distal determinants aids the household members' ability to have a secure house, nutritious food, sanitation facilities, improved drinking water, improved hygiene and also appropriate health care.

(ii) Street food habits (HAB): Consuming street foods (at least once a day) is common in urban regions, as the food is low in cost and easily accessible for a highly mobile urban population. However, they come at a health cost, due to unhygienic environments, the unregulated nature of the street food industry, and the presence of contaminated water. Consumption of street foods, such as ice gola, panipuri, fruit juice, and carbonated drinks, acts as proximal determinants of health that influences WBDs.

(iii) Insecure housing and hygiene (INHH) in Ward A: This component includes hand washing practices, private access to toilets at home, the type of housing (pucca, semi-pucca, and kutchcha), and unhealthy habits among household members (like consuming alcohol, smoking cigarettes, and doing drugs). Secure housing is a distal determinants on the water quality and the level of sanitation. It is presumed that a pucca house will have piped water on the premises and will have a private toilet that is hygienic, as compared to using a public or community toilet or engaging in open defecation. These indicators are complemented by

proximal determinants of health, the habits (such as consuming alcohol, smoking cigarettes, and doing drugs) and hand washing practices within the household.

(iv) Drinking water (DW) from other sources in Ward B: This component includes those households that receive water from public taps, standby pipes, wells that have been dug, and other sources that are proximal causes of the WBDs.

(v) Good water quality (WQ): The quality of water supplied at home dominates as one of the proximal determinants in addressing water- and vector-borne diseases. Water quality was assessed based on the household members' perceptions (smell, color, and taste) of the water quality and whether it was suitable for drinking and/or cooking.

(vi) Non-Hindu (NH) households in Ward A: Religion plays a significant distal role in accessing housing, education, and health care in the city as well as determining individuals' legitimacy in society.

(vii) Native Hindu households (NHH) in Ward B: Nativity plays a significant distal role in accessing good housing, education, and health care in the city as well as determining individuals' legitimacy in society.

(viii) Vulnerable households (VH): This component is assessed based on a percentage of dependable members (dependable access to enough food for active living) in the household (< 5 and > 60 years of age), the number of household members working as daily wage earners, and the nativity of the household members. Vulnerable members in the households and higher percentage of household members working as daily wage earners are distal causes for a higher risk of infectious diseases. Nativity of the household members provides access to secure housing, land tenure, and health care facilities.

(xi) Health care and hygiene (HC) in Ward A: Insurance plays a significant proximal role in enhancing household members' access to health care and determines the environmental hygiene around the house.

(x) Unhealthy habits and hygiene (UH) in Ward B: Unhealthy habits (i.e., such as consuming alcohol, smoking cigarettes, and doing drugs) and a higher number of household members sharing one room, are conducive proximal causes to the spread of infection.

Findings

Poisson regression was carried out to identify the significance of the components influencing WBDs in the wards. In both wards, the Poisson regression revealed that vulnerable households and good water quality had a significant association with WBDs in both the case study wards (Table 2).

Vulnerable households had a lower income, a lower percentage of dependable members, and a higher percentage of members employed as daily wage earners. They belonged to both Muslim and Hindu religions. For one factor of standard deviation in this component, the incidence rate of WBDs increased in the wards by 26% and 50%, for Ward A and Ward B respectively.

Availability of good WQ did have a positive association with WBDs. For one factor of standard deviation in this component, the WBDs decreased by 24% and 32% for Ward A and Ward B wards, respectively. Households reporting good water quality were native to Gujarat, had good housing, higher incomes, their own water sources, and fewer household members sharing one room.

In addition to these common components, ward specific components significantly influenced the WBDs. Non-Hindu households in Ward A had a positive association; for one factor of standard deviation, the incidence rate of WBDs increased by 35%. These households had rented

11

accommodations, poor quality housing, did not have private toilets, and reported that water stagnated around their houses. Many of these households seemed to be living in informal settlements.

Interestingly, in Ward B, households that reported receiving DW from public standpipes also reported decreased incidences of WBDs; for one standard deviation in this component, the incidence decreased by approximately 46%. This is in contrary to the widely held belief that piped water into dwellings could reduce incidences of infectious diseases.

Table 2
PCA for Ward A and Ward B

		Ward A		Ward B	
S. No	Components	IRR	P >	IRR	P >
1	HEE	1.04	0.676	1.13	0.335
2	HAB	0.84	0.178	1.06	0.632
3	INHH	0.91	0.436		
4	DW	-	-	0.54	0.019*
5	WQ	0.76	0.017*	0.677	0.001*
6	NH	1.3	0.026*		
7	NHH			1.21	0.139
8	VH	1.2	0.055*	1.49	0.001*
9	HC	1.03	0.777		
10	UH	-	-	0.77	0.055

Note: * reveals significant associations

Institutional analysis of water-borne diseases

The poison regression reveals the importance of religion, good water quality, household vulnerability, and the sources of drinking water; all of which played a significant role in influencing urban health. These components are shaped by diverse social, demographic, economic and political factors at different periods in time. Analyzing the drivers behind these

factors will help in identifying the institutions responsible and capable to secure urban health and a locus for health governance in the region.

Ahmedabad was an illustrious city during the Mughal period, from the fifteenth to the seventeenth centuries, when textiles significantly contributed to the city's economy. The textile producers were divided into many groups based on caste and religion but were all connected through a sequence of well-established operations (Yagnik & Sheth, 2011). The colonial period, in the nineteenth and early twentieth century, transformed decentralized caste-based activities into centralized caste-based tasks in the mills. This led a division of the community into two groups: the skilled millworkers from higher-caste Hindus and Muslims living within the walled city in 'pols' and 'mohallas;' and the labor intensive, low paid workers that were primarily Muslims and lower peasant class Hindus living on the outskirts of the walled city (currently these are in the city center, like Ward A), which was also known to be the industrial area. This division of settlements continued under the colonial urban planning mechanism, ignoring the improvement of existing built-up areas, such as chawls and other settlements, and did not embrace socio-culturally and economically plural Indian society (Oldenberg, 1985, Menon, 1997, p. 2934). The independent India witnessed a continuation of the colonial legacy of urban planning, which created the foundation for the current urban slums and poor urban water infrastructure.

With the neoliberal policies of the 1980s and the new economic policy in 1991, many textile mills closed down. This affected the housing, health, and the informal work force of the people who were dependent on the textile industries. It finally resulted in 'slums' or 'slum-like' settlements, similar to the 'de-industrialization' experienced in the North American and European cities (UN-Habitat, 2003). These historical developments significantly shaped the socio-economics of the current settlement pattern, the health care and informalization of the work force. First, the chawls became were overcrowded and could not be rehabilitated or reallocated, as the tenants enjoyed their tenancy rights with poor basic amenities. Second, it caused the loss of formal employment for the vast majority of retrenched workers (Breman, 2001), who were mainly Muslims or from the lower-Hindu castes. This displacement increased

the populations of the informal settlements, worsened the living conditions of the families, and caused the loss of the cheap or free medical care that had been provided by the textile industries (Breman, 2004). Third, massive retrenchment led to the 'informalization' of the workforce; they lost the social security provisions that they had previously enjoyed from their former sector jobs. The growing economic opportunities, resulting from a rapid urbanization trend, further increased the influx of migrant workers from other states to meet the growing demand for work forces.

Ghettoized diseases

Ward A represents one such de-industrialized centers. It was previously an industrial hub that was dotted with 'chimneys and chawls,' where the former was a symbol of the textile mills (emitting smoke) and the latter refers to the housing for the textile workers. The bulk of the labor force in the textile mills were Muslims and low-caste Hindus, all living in chawls. Efforts were made in the early 1940s to decongest these textile centers and to improve the housing condition of the chawls. These efforts largely benefited mainly the higher ranks of employees in the textile industry who were from the Hindu community, largely ignoring the majority of Muslims and the lower caste Hindus. Independent India continued with the colonial legacy of urban planning as a tool to clean and organize the city, by removing both informal settlements and unclean settlements, like chawls. The Hindu-Muslim clashes since AD 636, further accentuated ghettoization, whereby certain population groups were restricted or confined to particular areas. Though the process of ghettoization began in the 1960s with Hindu–Muslim clashes (prominent being the 1969 riot), it accelerated most prominently after the 2002 clashes (Breman, 2004). One significant impact from ghettoization is felt among the non-Hindu households living in Ward A, which is also considered as a 'hotbed' for Hindu-Muslim clashes.

In Ward A, non-Hindus constitute approximately 75% (113 of 150 HH) of the population, with majority (111 out of 113 non-Hindu households) of them being Muslims. Approximately 45% of Muslim households (50 of 111 households) reported incidences of WBDs between January and July of 2012 (Table 3). The Muslim households reporting incidence of WBDs lived in rented

14

housing (0.189 at 0.05 level), did not have their own toilet (0.287 at 0.01 level), and reported water stagnation around their house (0.168 at 0.05 level), which approximately increased the incidence by 35% compared to Hindu households.

Table 3 Muslim Households and Water-borne Diseases in Ward A

| | Total households | Water-borne Diseases | | | | | Water Stagnation | |
		No Cases	One case / house hold	Two cases/ househ olds	Three cases/ househ olds	Total disease incidence	Reported stagnation	Reported no stagnation
Non-Muslim households	39	31	7	1	0	8	20	19
Muslim households	111	61	37	10	3	50	78	33
Total	150	92	44	11	3	58	98	52

Informality increases the vulnerability of households

The rapid increase of informal settlements since the 1980s adds to the health burden in city. These settlements are groups of housing units that have been constructed on land areas on which they have no legal claim or occupied illegally, and hence lack any major infrastructures. The settlements arose due to an influx of migrant populations who were provided with asylum by the local politicians and civil societies or who were displaced from elsewhere in the city by various urban development programs. The influx of migrants or displaced populations was advantageous for local politicians and their vote-banks. The Ward A is known for its Muslim asylum seekers, especially after the 2002 city clashes. The ward has been ruled by the Indian congress party for more than a decade. The party claims to have secular values, in contrast to the Bharatiya Janata Party, which is considered to be pro-Hindutva, and has been a ruling party in the state of Gujarat since 2001. Also, the ward has held a number of vacant disputed lands over a long period of time, or owned but not used by the textile industries or other government departments (such as the Department of Forests). This provided a good opportunity for politicians to accommodate the population influx based on secular and safety values. After the 2002 clashes, some recent settlements included the Sahara nagar; the Gulab nagar (a huge Muslim settlement with

approximately 8000 individuals living in and around the solid waste dumping ground in the ward); and informal settlements around Chandola lake. All of these settlements are situated closer to the solid waste management site in the ward and lacked basic services due to their illegal status. It was only in 2012 that corporations started constructing public toilets and providing tankers for drinking water purposes. To compete, the Bharatiya Janata Party politicians from Ward B also provided asylum to Muslim households, but they had limited open spaces available. In spite of this, several informal settlements have arisen since 2002: Akbar Nagar, Chuval Nagar, Jamnanagar-2, Bajarang society, Sanjay Nagar, Chitrakot, and the Jalaram society. In both Wards, these informal settlements emerged in areas at the tail-end of the water distribution networks and have a poor geographical orientation (e.g., marshy lands, along the river banks, or on hillocks, such as Akbar Nagar in Ward B and Gulab Nagar in Ward A). This results in water leakages, poor water quality, less drinking water being available, and poor environmental hygiene (e.g., near the solid waste dumping ground in Ward A) (Saravanan, 2014).

This situation has given way to various philanthropist (such as the non-government organizations and political workers) that draw on human rights discourses to provide basic services, such as drinking water through public taps and community or private toilets. In the mid-1990s, a non-governmental organization initiated a program to provide basic amenities for those living in chawls and informal settlements in Ward A. The organization had negotiated with the Ahmedabad municipal corporation, and households that wanted to gain access to drinking water and sanitation were expected to pay INR 20 each month for about 10 months. Upon completion of this payment, the corporation provided drinking water outside their houses and, if space was made available, constructed a toilet for these households. Drinking water connections were made from the nearby pipelines outside the houses. However, toilets were more often built farther away from the houses due to lack of space within and around the houses. These were shared among other households and not always connected to sewage lines. Although these ad hoc measures helped the households to gain access to piped water and toilets, they were not safe and did not meet the standards required for a basic human existence; some of these structures were damaged or dilapidated and unfit for human use.

In addition, a government program provided water and sanitation under the Basic Urban Services for the Poor. These services largely consisted of public taps and community toilets. For the residents, although having private water connections inside their dwelling was a necessity they could not have the service due to their illegal hold on the land (or at least *de facto* documents to prove their legal status), which was also complicated by bureaucratic procedures. Non-state actors (i.e., political workers and private plumbers) came in handy to offer this informal service for those who could afford the cost of approximately INR 3000 to INR 6000 per connection. They, along with private plumbers, adopted various tactics to tamper with the main drinking water pipelines. Though these tactics made it possible for them to obtain more access to water, there was an inherent risk of it being contaminated by rainwater, overflowing sewage, and run-off water from roadsides, due to puncturing the pipelines. This created an appropriate environment of cross-contamination with sewerage waters and hence for breeding of diseases.

In Ward A, vulnerable households were those reporting higher percentages of members employed as daily wage earners and lower percentages of dependable members had a 26% higher chance of having WBDs. A higher percentage of household members employed as daily wage earners have lower incomes (0.241 at a 0.01 level) and live in poor quality housing (0.143 at 0.080). This increased with higher numbers of household members sharing one room (0.182 at a 0.05 level). Interestingly, the few households that considered themselves as native (having inhabited in this area for more than 10 years) also reported higher chances of having WBDs. These households lived in their own house (0.199 at 0.05 level), had a higher annual average income (0.196 at 0.05 level), and were more likely to be non-Muslims (0.150 at 0.067 level). These households are living in a society type of housing (0.157 at 0.56 level) and may be close to informal settlements. Though these households are located within the informal settlements, a few better off households living around these settlements are similarly affected: they are increasingly prone to water-borne diseases, like in the Ward A ward.

The situation was not very different in the Ward B ward, where vulnerable households that reported fewer dependable members and had a higher percentage of daily wage earners had a

50% higher chance of being infected with WBDs. Fewer dependable members in the households were not native of Gujarat (0.167 at 0.05 level), received poorer water quality (0.241 at 0.01 level), were from the Muslim community (0.155 at 0.05 level), used unhygienic means to wash their hands (0.157 at 0.05 level), reported water stagnation around their house (0.157 at 0.01 level), had higher number of members employed as daily wage earners (0.176 at 0.05 level), and reported higher WBDs cases (0.228 at 0.01 level). The households in this component consisted of young families (due to less dependable household members), had poor housing and environmental conditions.

Interestingly few (about 9) households receiving drinking water from other sources (such as public taps) reported decreased incidences of WBDs (for one factor of standard deviation, a decrease of 46% is noted) in the Ward B ward. These households did not have their own toilets, were Muslims (0.175 at 0.05), lived in chawls (0.176 at 0.05), were not native of Gujarat (0.276 at 0.01), had a poor quality of housing (0.415 at 0.01), lived in rented or leased housing (0.578 at 0.01), did not wash their hands hygienically (0.254 at 0.01), received a lower annual average income (0.284 at 0.01 level), had a fewer number of members sharing one room (0.228 at 0.05), and had a fewer number of adults educated beyond the tenth grade (0.272 at 0.01). Household members in this ward claim that the public taps are directly connected to the main drinking water pipelines and offer better water quality, as compared to water lines to dwellings which are connected to the tertiary pipes. These pipes highly tampered for illegal connections and due to mixing of wastewater they offer poor water quality.

Urban planning for the rich and the better off

The planned settlement largely benefits the rich, who can afford better housing, their own water sources and toilets, and live in hygienic environments. In Ward A, household reporting good water quality had a positive significant association with WBDs (for one fact of standard deviation, the WBDs decreased by 24%). Private builders were promoting housing societies in the Ward A on illegally occupied lands. Many of the housing societies are either independent

bungalows or apartments; that provided housing to those with higher incomes (0.196 at 0.05 level), offered them good housing (0.179 at 0.05), and provided toilets inside the houses (0.320 at 0.01 level). These household members are employed in white-collar jobs, hygienically washed their hands with soap (0.433 significance at 0.01 level), and had a fewer number of households sharing one room in the house (0.422 at 0.01 level). Many of these households have their own water sources and in-house water treatment facilities.

In Ward B, households reporting good water quality had a positive significant association with WBDs (for one factor of standard deviation, the WBDs decreased by 32%). These households were native of Gujarat (0.158 at 0.05 level), were Hindus (0.147 at 0.052 level), had higher percentages of dependable members in the household (0.241 at 0.01 level), reported no water stagnation around their houses (0.158 at 0.05 level), and lived in rented or leased housing (0.143 at 0.057 level), excluding chawls (0.218 at 0.01 level). Though planned settlements include apartments and societies, the latter were safer compared to apartments. These apartments are a low cost housing source promoted by the government in 1970s for textile mill workers at a subsidized cost. The apartments are highly dense and cannot accommodate higher numbers of families; additionally, the urban water services are highly polluted. Comparatively, 28% (51/177) of the households living in societies (e.g., independent bungalows) had a larger space for housing expansion and reported lower incidences of WBDs (0.173 at 0.05 level).

Urban health in rapidly growing economies: A vicious cycle

This paper demonstrates the deeply rooted structural inefficiencies affecting urban health that has created opportunities for contemporary actors to exploit and sustain, thereby creating conducive environments for breeding water-borne diseases in the city. Applying historical and rational choice institutionalism, the paper identifies three turning points that the governments failed to capitalize in its historical trajectories. First was during the colonial era that set the foundation for the contemporary urban health crisis. Transformation of decentralized caste-based household activity into centralized caste-based tasks in the textile mills created a hierarchy-based

19

employment. This was followed with 'clean, orderly and safe' zoning for the colonial residents, which ignored the infrastructure and amenities for the native population. Second trajectory was at the time of independence, when the country failed to capitalize on their freedom to contextualize their urban policies and programs. They merely mimicked and inherited the reforms of their colonial counterpart. The inheritance of urban planning mechanism continued segmenting the urban population as legal and illegal ignoring the socio-economically and culturally plural Indian society. The post-colonial reforms followed a rigid land use planning, a land tenure system, and other policies that turned a blind eye to the urban poor. This compounded with the failure of the state to contain the Hindu-Muslim clashes led to ghettoization of settlements. The final trajectory that the government failed to capitalize was at the time of implementing the neo-liberal reforms, which failed to protect the interest of retrenched textile mill workers impacting their housing, health and their livelihood. The passivity of the government remains a major hurdle in improving urban health. In all these trajectories, health was never a priority.

The social actors, such as non-governmental organizations, political workers, and committed individuals exploit the passivity of the government to provide ad hoc services to the needy population. While these ad hoc arrangements could offer a breathing relief, they were not safe and secure, nor sustainable. These ad hoc interventions have resulted in the growth of numerous illegal water connections, the mixing of drinking water and sewage water, land (and water) grabbing by the urban residents and water logging around these houses—all of which offer a perfect breeding ground for water- and vector-borne pathogens. The government's response has been primarily adopting 'fire-fighting' approaches to manage the crisis, such as by relaying pipelines, regularizing the informal settlements, providing drinking water and toilets without sewerage disposal system, and distributing drugs to combat infectious diseases. Although these measures could offer curative and 'fire-fighting' strategies, they in fact lead to a vicious cycle of inefficient urban health.

The urban health reforms have improved significantly in the past. The urban health department has several preventive programmes, such as the Reproductive and Child Health Programme, the

National Vector-Borne Disease Control Programme, the Revised National Tuberculosis Control Programme, and the AIDS Control Society. In addition, it runs several awareness campaigns to educate the people to avoid water- and vector-borne diseases, offers drugs and distributes oral rehydration solutions and mosquito coils and nets. All these programmes are implemented by an army of multi-purpose workers (MPWs) and link workers, who form the critical connection between the urban poor and the health infrastructure. In addition, they are supported by non-governmental organizations. These measures have significantly increased the coverage of services, however, its inability to reduce health inequality and growing disease burden has challenged these economies.

Recent interest on urban health has mainly focused on improving coverage and expanding service delivery. An assessment of the health care reforms across the rapidly growing economies reinforces these and calls for improving the quality dimensions by taking a comprehensive approach to urban health (GoI, 2014), increasing public spending, stewarding mixed public-private systems, ensuring equity, meeting the growing human resources, and addressing the social determinants of health (Gragnolati et al., 2013; Martens et al., 2014). However, these measures are focused on the health as a sector in facilitating preventive and curative care, rather as an overarching theme urban governance. In urban planning and governance cities of rapidly growing economies health remains a tail-ender. The health department officials are only considered to provide services (preventive and curative) and are only called when there is an outbreak of diseases. Rarely is health on the agenda of other departments involved in planning, housing and water infrastructure. Urban health systems are highly complex involving many 'sub-actions' across other departments with numerous goals (Dasgupta & Bisht, 2010). The study in Ahmedabad reveals that health is not only about coverage and expanding service delivery (tail-enders) but also have to be considered and be integral part of the urban planning and governance process.

The application of historical institutionalism and rational choice institutionalism offered insights on the structural constraints that facilitate the breeding of diseases. It informed how poor urban planning, unclear land tenure systems, inadequate water supply and sanitation, and inadequate

health care management influence urban health. However, it does not offer insights on how these policies and programs should be modified for a desired change.   In specific, it raises questions about the political economy of the health sector and the relative roles of national and international interest groups and of their different understandings of the development options (Bloom, 2014). Organizational institutionalism, a sub-field of sociology, could offer potential insights on the role of agents in bridging the gap between policy prescription and its implementation (Powell & DiMaggio, 1991, Giddens, 1984). In specific, it can offer insights on how various social actors (such as non-governmental organizations, political workers and others) played a crucial role in integrating macro development concerns to local realities of urban housing, integrate the statutory rules and the socially embedded norms, and to navigate complex power dynamics for a change (Brinkerhoff & Bossert, 2013). Complementing the historical, rational choice and organizational institutionalism approach can provide insights for comprehensive interventions and means to make health an integral part of the urban planning and governance.

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Appendix 1
Total Incidence Rate (rate per 100,000) of Water- and Vector-Borne Diseases
(2010-2013) in Ward A (BEH) and Ward B (BAPU) and the City Average (CITY)

Year	Gastroenteritis			Jaundice (out-Patient)			Jaundice (in-Patient)			Typhoid		
	BEH	BAPU	CITY	BEH	BAPU	CITY	BEH	BAPU	CITY	BEH	BAPU	CITY
2010	359	628	144	244	17	35	69	58	23	24	100	15
2011	198	400	80	57	748	64	265	254	58	55	130	24
2012	379	571	100	322	43	32	116	295	43	42	118	22

Source: Department of Health Statistics, AMC, Ahmedabad.