

## Response-oriented measuring inequalities in Tehran: second round of Urban Health Equity Assessment and Response Tool (Urban HEART-2), concepts and framework

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### Abstract

**Background:** Current evidence consistently confirm inequalities in health status among socioeconomic groups, gender, ethnicity, geographical area and other social determinants of health (SDH), which adversely influence health of the population. SDH refer to a wide range of factors not limited to social component, but also involve economic, cultural, educational, political or environmental problems. Measuring inequalities, improving daily living conditions, and tackling inequitable distribution of resources are highly recommended by international SDH commissioners in recent years to 'close the gaps within a generation'. To measure inequalities in socio-economic determinants and core health indicators in Tehran, the second round of Urban Health Equity Assessment and Response Tool (Urban HEART-2) was conducted in November 2011, within the main framework of WHO Centre for Health Development (Kobe Centre).

**Method:** For 'assessment' part of the project, 65 indicators in six policy domains namely 'physical and infrastructure', 'human and social', 'economic', 'governance', 'health and nutrition', and also 'cultural' domain were targeted either through a population based survey or using routine system. Survey was conducted in a multistage random sampling, disaggregated to 22 districts and 368 neighborhoods of Tehran, where data of almost 35000 households (118000 individuals) were collected. For 'response' part of the project, widespread community based development (CBD) projects were organized in all 368 neighborhoods, which are being undertaken throughout 2013.

**Conclusion:** Following the first round of Urban HEART project in 2008, the second round was conducted to track changes over time, to institutionalize inequality assessment within the local government, to build up community participation in 'assessment' and 'response' parts of the project, and to implement appropriate and evidence-based actions to reduce health inequalities within all neighborhoods of Tehran.

**Keywords:** Health inequality, Urban HEART, Social determinants of health, Community based development.

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## Introduction

Talking about 'health inequality' in public health implicitly denotes 'socioeconomic inequality in health'(1). To acknowledge the importance of striving for equity -in particular health equity-, it is necessary to know how extensive the differentials in health and its determinants globally are. In every part of the world, and in every type of political and social system, differences in health have been noted between different social groups in the population and between different geographical areas in the same country (2). Studies over the past decades have consistently shown inequalities in health status among socioeconomic groups, gender, ethnicity, geographical area and other measures associated with social determinates, which adversely influence health (3-5). Social determinants such as occupation, education, life style, basic amenities, house overcrowding and in general terms, economic circumstances affect the health of the population in different generations over decades(6). Inequalities may even adversely affect health status as shown in animal models(7). Income inequality has been shown that correlates with health status in different countries (8).

The way in which health inequality has customarily been documented is by comparing differences in the average health across groups, for example, by sex or gender, income, education, occupation, or geographic region. In the controversial World Health Report 2000, (9, 10) researchers at the World Health Organization criticized this traditional practice and proposed to measure health inequality across individuals irrespective of individuals' group affiliation (11).

### *Social determinants of health*

There is consistent evidence that disadvantaged groups have poorer survival chances, dying at a younger age than more favoured groups. For example, a child born to professional parents in the United Kingdom, was expected to live over 5 years longer than a child born into an unskilled

manual household (12). According to the final report by the Commission on Social Determinants of Health (CSDH), in Japan or Sweden people can expect to live more than 80 years; in Brazil, 72 years; India, 63 years; and in one of several African countries, fewer than 50 years, while within countries differences in life expectancy are dramatic and are seen worldwide (13). In France, the life expectancy of a 35 year old university lecturer is 9 years more than that of an unskilled manual worker of the same age (2). In Hungary, the Budapest Mortality Study found that males living in the most depressed neighborhoods had a life expectancy of about 4 years less than the national average, and 5 years less than those living in the most fashionable residential district (14). In Spain, twice as many babies die among families of rural workers as among those of professionals (2). In Iran, infant mortality rate in poor provinces was 2.34 times more than affluent areas in 2005 (15).

Social determinants of health refer to a wide range of factors not limited to social component; arising from economic, cultural, educational, political or environmental problems. This inclusive definition of SDH was the cornerstone of our conceptual framework which led to 65 indicators in six policy domains of Urban HEART (16). SDH refers to both specific features and pathways by which societal conditions affect health and that potentially can be altered by informed action (17). CSDH called for 'closing the health gaps in a generation', in its final report in 2008, emphasizing on Primary Health Care (PHC) approach (13) which was acknowledged in a large gathering by WHO in October 2011 which in turn led to Rio Declaration (18).

### *Health equity or inequality?*

Equal worth of all people is acknowledged in the religious beliefs and also is a universally accepted idea (19), while health has a particular value for all individuals and could be assumed as one of the core principles of human right, which has been declared by WHO (20). The distinction be-

tween 'inequity' and 'inequality' in health is rather a philosophic and moral dilemma (theories of 'justice' and 'society') (21). Health equity has been defined as: the absence of systematic disparities in health (or its determinants) between more and less advantaged social groups in terms of wealth, power and prestige (22). Additional considerations such as preventability or necessity have been proposed to judge whether a difference is inequitable, i.e. a difference could be considered inequitable if the factor is avoidable or it is not necessary (2). However even highly risky behavior such as sky diving could be avoided; therefore the tragic outcome might not be inequitable (21). On the other hand there are viewpoints indicating that risk taking behaviors revolve around individuals' free will, free choice and their own responsibility, which may not be supposed as unfair; while these risk taking behaviors such as physical inactivity, smoking or addiction are consequences of social disparities and unequal opportunities enrooted in socio-economic determinants of health. We have numerous examples of health inequalities in our experience (Urban HEART), which could be assumed as unfair and consequently inequity.

Health actions should be directed, at least in part, towards eliminating inequities in health. Whatever we take as theoretical basis, underlying principles or different wordings, all is about injustice (20). To tackle the main controversies and challenges regarding the 'equity', Urban HEART model emphasizes at 'health inequalities' (16). Disparities and health inequalities mainly affect socially disadvantaged groups, who should be targeted in a balanced and sustainable urban planning. Presenting the health and SDH inequalities (as matrices; see below) to policy makers, practitioners, mayors, city governors, different sectors in the city, and the community, will make sufficient motive among all parties to reduce the inequalities.

### *Measuring inequalities in health*

Measuring inequalities in health and its social determinants (SDH) is prerequisite for any master plan for healthy and sustainable cities. Urban Health Equity Assessment and Response Tool (Urban HEART) was originally developed by the WHO Kobe Centre (WKC: WHO Centre for Health Development) as "a user-friendly guide for local and national officials to identify health inequities and plan actions to reduce them." Urban HEART was pilot tested in Tehran in 2008 and officials from 60 countries –including 22 countries in Eastern Mediterranean Region have been trained to employ this user-friendly guide so far. 'Urban HEART' seeks to give policy and decision makers at national and local levels, to:

1. Identify the differences between the health, health determinants and well being of people living in disadvantaged urban areas and the general population; and
2. Determine appropriate, feasible, acceptable, and cost-effective strategies, interventions and actions which should be used to reduce inequity gaps between people living in the same city.

Employing Urban HEART may have several bi-products for different parties such as determining a unique index to measure inequities for policy makers, identifying current gaps and relationship to other indices for public health practitioners, and empowering interested parties including community-based organizations, state or councils at localities, and ordinary dwellers.

Urban HEART is rather a strategic approach to define and track equity and health equity in urban settings. The Urban HEART has a "health equity" assessment component to measure the 'equity', and a 'response' component that encourage urban local governments to employ the best approaches to fill the existing gaps. The former component assists the authorities in cities conduct a systematic assessment of unfair health conditions in the urban setting. To do this, it stimulates users to think

about the equity aspect of indicators.

For ease of analysis, the tool suggests reviewing evidence within four major policy domains including 'physical environment and infrastructure', 'social and human development', 'economics', and 'governance'. These policy domains were extended to six in Tehran model, where 'health and nutrition', and also 'cultural' domains were added. The health equity component also has a monitor (for trend) and a matrix (to compare different locations) that enable policy and decision makers to plot out health indicators (e.g. percentage of households with access to safe water) in such a way that a quick comparison can be made between the city and country (and ultimately global or international standards) and the extent of difference between disadvantaged city areas, the rest of the city and the country average, which provides sufficient evidence for decision making.

## Method

### *Selection of indicators*

Based on our previous experience in UH-1, the steering committee reviewed all available sources of information at international, national and local levels to determine health and socio-economic indicators and appropriate approaches for data collection. UH-2 was mainly response-oriented, which indicates that all parts of equity assessment should be directed towards an action within the local community. Therefore a set of criteria was considered to select indicators: SDH-oriented, equity-oriented, internationally or nationally recognized, precise definition, comprehensiveness, and response-oriented. The steering committee also considered the indispensable regulations by the City Council, including adding cultural component to the main policy domains of Urban HEART. Table-1 demonstrates policy domains and indicators in both rounds of Urban HEART.

According to the documents reviewed in the working groups and steering committee, some indicators were added, amended or discarded. Among new indicators, there are

green area, chronic diseases (self-report), oral health, physical activity, pain, equal opportunity (inter-generation equality), various home appliances (dish washer and microwave), number of children books, and food insecurity. Amendments were conducted either in the definition of selected indicators or the way of measurement; for example we changed the definition of access to toilet, so as to estimate the rate of standard sanitary toilets, or timely vaccination rate was targeted to avoid sophisticated observation and documentation of all vaccine types. In addition, due to changes in health insurance funds, necessary modifications were made. We also altered the way of administration for selected variables: our approach towards measuring body mass index (BMI), access to public transport, and waste management were changed to self report. Finally a number of indicators such as access to tap water, and maternal mortality rate (MMR) were discarded.

### *Sampling design*

According to the official boundaries in Tehran, there are 374 neighborhoods across 22 districts, while six neighborhoods were non-residential or inaccessible due to security reasons, which were discarded from UH-2 study. To collect data in the remaining 368 neighborhoods of Tehran, a multi-stage sampling was performed. Comprehensive map of Tehran in 2011 was selected as the sampling frame. The first and the second stages were stratified sampling. Twenty two districts of the municipality and 368 neighborhoods were considered as stratum in the first stage and the second stage respectively. The third stage was cluster sampling and each block was treated as one cluster. Using GIS maps and a software to select random numbers, blocks were randomly identified to be included in the survey.

We required eight households in each block according to an eight-box table, which stands for four age groups (15-24, 25-44, 45-64, and 65 and over) for both sex. Employing a standard sample finding

in population surveys, investigators started sample finding in each block by counting all houses first (by counting rings and excluding business places, and vacant houses/flats), and then the total house numbers were divided by eight to reach the 'gap number'. Following this, the investigator had to start the sample finding from the far right hand side using a random number, and then skipping the 'gap number' so as to find the second house. Similar to the first round of the project, no substitution was permitted to ensure the randomization (16).

### *Sample size*

Each district was considered independently to calculate sample size. Sample size was then calculated based on Cochran formula  $\frac{Z_{\alpha}^2 \times p(1-p)}{d^2}$  as 1535 households in each district based on variables with at least 10% prevalence with a margin of error (d) of 0.015 and a confidence interval (CI) of 95%. Then to facilitate the allocation of sample to the mentioned eight-box table that had to be completed for the individual questionnaires and also to reach higher precision, the sample was expanded to 1600 households, regardless the population size in each district. Therefore, we assigned 200 blocks to each district equally. To allocate samples at neighborhood level, method of the probability proportional to size of each district was used. Details of sampling frame and the structure of survey across 22 districts are presented in table.3.

Three sets of questionnaires were used in UH-2 (see below and table. 2). The total sample size was almost 34000 households for the first (household) questionnaire covering 118000 individuals from 368 neighborhoods, while a random sub-sample of 25000 cases were selected to reach a gender balanced sample across all districts. For the third questionnaire (food frequency questionnaire), only one household within each block (n= 4400 cases) was selected conveniently to ensure their participation and responsiveness.

### *Statistical analysis*

Descriptive (including central tendency, dispersion, percentile, cross-tabulation, and graphs) and inferential (such as t-test, correlation, regression models, principle component analysis, and non-parametric analysis) statistics and inequality analysis were used for different variables.

In order to overcome insufficient sample size at neighborhood level, particularly in neighborhoods with less than 10 blocks (i.e. less than 80 households), which account for 167 among the total 368 neighborhoods, and to provide reliable estimates of different variables, we used small area estimation, based on Bayesian methods, which has been used extensively in recent years to solve small area estimation problems (23). This was initially tested to estimate the prevalence of low back pain in our study, which was highly reliable (r=0.97) comparing with the real estimations at district level. Due to the binary nature of chronic low back pain as response variable alongside available auxiliary data in unit-level, a logistic mixed model and hierarchical Bayes (HB) approach were used to estimate model parameters. This approach was conducted for several variables which led to exceedingly reliable results. Details of small area approach have been presented elsewhere.

### *Questionnaires*

There were three types of questionnaires consisting of 20 parts. The first 14 parts were completed for all selected households in the blocks and the remaining six parts (mental health, quality of life, social capital, body pain, physical activity and oral health) were completed by selected individual in each household. The last type of questionnaire, designed especially for food frequency, was completed for a selected household within each block.

In Urban HEART-2 we have collected data about demographics, assets, children health, accidents, domestic violence, disabilities, smoking and addiction, chronic diseases, household costs, nutrition habits,

food insecurity, health service utilization and also individual data about mental health, health-related quality of life, pain, physical activity, social capital and oral health, through a multi-stage cluster random sampling proportional to population size at neighborhood level.

#### *Data collection*

The whole process of data collection, local monitoring, data entry, and pooling were implemented by various parties in the municipality to build the capacity for further surveys, to minimize the costs and to ensure sustainability of measuring and responding to health inequalities. Five two-day workshop were organized to train 1240 surveyors (auxiliary health workers based in the same neighborhoods) and local supervisors to ensure that they know how to communicate with the families and encourage them to participate in survey, their capability to understand variable definitions, questionnaire instructions, sample finding, managing non-response cases, daily report and field supervision, and all details required for conducting the survey including security problems.

There was a multi-dimensional monitoring system including local supervision at neighborhood level, district monitoring by trained officers at district level, regular field visiting by trained officers at municipal level and telephone control by high rank members of steering committee.

#### *Individual questionnaires*

General Health Questionnaires (GHQ-28) is a well known mental health tool, which was initially developed by Goldberg and Hillier (1979) for screening somatic symptoms, anxiety and insomnia, social dysfunction and severe depression. A review of studies on the validation of the GHQ-28 in different countries, including Iran, demonstrates its high validity and reliability as a screening tool of mental disorders in the community(25). The best cutoff point, determined using the conventional scoring

method and the minimum overall misclassification rate, was 6: that is, those scoring 6 and above were designated as possible cases of mental disorder. Sensitivity, specificity and overall misclassification rate for a GHQ-28 cut-off score of 6 were 84.7%, 93.8% and 8.2%, respectively(29).

Short Form-12 (SF-12) is a well known tool to measure health-related quality of life, which was also administered in the first round of Urban HEART in Tehran. (26) SF-12 consists of 12 questions which leads to two major scores i.e. 'physical component score' (PCS) and 'mental component score' (MCS). Social capital was assessed by a specific tool designed locally for the previous round of Urban HEART(27). The social capital tool covers two main dimensions -structural and cognitive- which measure six components of social capital i.e. collective activities, voluntary help, social cohesion and inclusion, social network, reciprocity and trust.

A simple pain questionnaire which deals with the incidence and prevalence of either acute or chronic pain (longer than three months) in different sites such as back pain, neck, shoulder, limbs, knee pain, headache and toothache, was completed by the same selected individual. The last question for all types of pain asked about seeking medical advice. In total, 24874 individuals (52.5% female) completed pain questionnaire. We added a specific section for oral health, consisting of utilization of dental service, oral health behaviors (using toothbrush and toothpaste), oral quality of life, and observing tooth loss or decay. More than 24400 over 15 year's old adults responded to the oral health questionnaire.

The last part of individual section was Global Physical Activity Questionnaire (GPAQ) as a WHO-approved standard tool, which had been validated in several cross-national (28) and national studies (30), was self-administrated to a selected person within each household. There are 3 main domains in the PA tool, which measures physical activity at work, commuting and recreation. Data on the prevalence of phys-

ical activity were completely collected for 17153 adults over 15 years old across 22 districts of Tehran.

*Framework of 'response' part*

According to the 'neighborhood-orientation' policy endorsed by the City

Table 1. Urban HEART indicators: comparing indicators in two rounds (UH-1:2009; UH-2: 2012)

Domain	UH-1	UH-2
Physical and infra-structure	<ol style="list-style-type: none"> <li>1. Healthy water</li> <li>2. Accidents and injuries (5 indicators)</li> <li>3. Air pollution</li> <li>4. Noise nuisance</li> <li>5. Access to public transport</li> <li>6. Solid waste management</li> <li>7. Health centre utilization</li> </ol>	<ol style="list-style-type: none"> <li>1. Healthy water</li> <li>2. Traffic and non-traffic (domestic) accidents</li> <li>3. Occupational injuries</li> <li>4. Air pollution</li> <li>5. Noise nuisance</li> <li>6. Access to public transport</li> <li>7. Solid waste management</li> <li>8. Sanitary toilet</li> <li>9. Access to wastewater system</li> <li>10. Green area per capita</li> <li>11. Sport area per capita</li> <li>12. Children play ground</li> <li>13. Disable-friendly areas</li> <li>14. Urban decay (to strengthen against earthquake)</li> </ol>
Human and social development	<ol style="list-style-type: none"> <li>1. Education: NER/ GER/ primary school completion/ Higher education (4 indices)</li> <li>2. Violence: domestic, street</li> <li>3. Smoking/ addiction</li> <li>4. Smoke-free places</li> <li>5. Mental health</li> <li>6. Social capital</li> </ol>	<ol style="list-style-type: none"> <li>1. Net enrolment rate</li> <li>2. Primary school completion rate</li> <li>3. Higher education rate</li> <li>4. Domestic violence</li> <li>5. Social capital</li> <li>6. Women headed families covered by social security</li> </ol>
Health	<ol style="list-style-type: none"> <li>1. Safe delivery</li> <li>2. Vaccination</li> <li>3. Teenage pregnancy</li> <li>4. Breastfeeding (excl &amp; 24m)</li> <li>5. Infant (IMR)/ Under five (U5MR)/ and maternal mortality rate (MMR)</li> <li>6. Health related quality of life (HRQL)</li> <li>7. Disability</li> </ol>	<ol style="list-style-type: none"> <li>1. Safe delivery</li> <li>2. In-time vaccination</li> <li>3. Teenage pregnancy</li> <li>4. Breastfeeding (exclusive BF and duration)</li> <li>5. Neonatal (NMR)/ Infant (IMR)/ and Under- five mortality rate (U5MR)</li> <li>6. HRQL</li> <li>7. Disability rate and access to special healthcare services</li> <li>8. Crude mortality rate and life expectancy (LE)</li> <li>9. Prevalence and incidence rate of myocardial infarction, stroke, hypertension, cancer, diabetes, asthma, and osteoporosis</li> <li>10. Health centre utilization</li> <li>11. Basic and complementary health insurance rate</li> <li>12. Oral health and missed teeth</li> <li>13. Physical activity</li> <li>14. Pain prevalence and incidence</li> <li>15. Mental health</li> <li>16. Domestic violence</li> <li>17. Smoking and addiction</li> <li>18. Utilization of quit addiction services</li> <li>19. Suicide (and committing suicide) rate</li> <li>20. Wasting and stunting among under five years children</li> <li>21. Body mass index</li> <li>22. Nutrition habits</li> <li>23. Food insecurity</li> </ol>

Table 2. Urban HEART indicators: comparing indicators in two rounds (UH-1:2009; UH-2: 2012)

Economic development	<ol style="list-style-type: none"> <li>1. Employment</li> <li>2. Residency in normal home/ Person/ room</li> <li>3. Fair Financial Contribution Index (FFCI)</li> <li>4. Household costs</li> <li>5. Absolute/ Relative poverty</li> <li>6. Social Welfare Index</li> <li>7. Human Development Index</li> </ol>	<ol style="list-style-type: none"> <li>1. Employment</li> <li>2. Room and area per capita</li> <li>3. Household costs</li> <li>4. Fair Financial Contribution Index (FFCI)</li> <li>5. Catastrophic payment rate</li> <li>6. Absolute poverty, susceptibility of households to poverty</li> <li>7. Multi-dimensional poverty</li> <li>8. Polarization rate</li> <li>9. Unequal opportunities</li> <li>10. Human Development Index</li> </ol>
Governance (Municipality)	<ol style="list-style-type: none"> <li>1. Annual reports</li> <li>2. Contracts transparency</li> <li>3. Satisfaction</li> <li>4. Responsiveness (Hot Lines)</li> <li>5. Community participation (local elections)</li> <li>6. Lawfulness</li> <li>7. Standard activities</li> </ol>	<ol style="list-style-type: none"> <li>1. Satisfaction with municipality services</li> <li>2. Responsiveness of the municipality (Hot Lines)</li> <li>3. Community participation (local elections)</li> <li>4. Population covered by health volunteers (in health centers) and health auxiliaries affiliated to the municipality</li> </ol>
Nutrition	<ol style="list-style-type: none"> <li>1. Calorie poverty</li> <li>2. Wasting</li> <li>3. Stunting</li> <li>4. LBW (IUGR/ NMR)</li> <li>5. BMI: obesity</li> <li>6. Food diary</li> <li>7. Food costs</li> <li>8. Cereal costs</li> </ol>	Integrated with 'health' domain
Cultural		<ol style="list-style-type: none"> <li>1. Respect to values: truth, bailment, forgiveness, fairness, honesty, frankness, lawfulness, caring others, respect to elderly</li> </ol>

Council, municipality of Tehran has established 'neighborhood hall', which hosts neighborhood council elected directly by local residents. There are almost ten local structures within neighborhood halls including 'health house' where at least two auxiliary health workers –partially paid by the municipality- provide social health and counseling in all 374 neighborhoods. There are six working groups endorsed by the City Council, consisting of volunteer local experts, local authorities and NGOs in each 374 neighborhoods of Tehran. These local working groups cover 'social, educational and empowerment', 'health and environment', 'culture', 'emergency, safety and resilience', 'sport and recreation', and 'service provision and welfare'.

Our main focus in UH-2 was on knowledge transfer to all neighborhoods councils and other local structures to raise

their awareness about SDH status at their localities so as to prioritize their health (and SDH) problems and implement appropriate activities to reduce inequalities. In order to facilitate participation of local residents, an integrated local committee was established to select up to three health and SDH priorities within the neighborhood and develop appropriate action plan to reduce inequalities in a given time; see below for more details. These plans of action are being monitored within district and being evaluated by third parties across Tehran.

### Discussion and Conclusion

Health inequities are embedded in societal inequities, which 'deprive subgroups of the population to benefit from social and economic development' (18). Therefore we focused on different aspects of socio-



Table 3. Details of questionnaires included in Urban HEART-2 project

Questionnaire category	Sampling frame	Sample size	Details
Household questionnaire	1600 households in each 22 districts; 8 households in each block	34700 families	1- Household information (16) 2- General household characteristics 3- Household assets 4- Family health (mother and child health, deaths) 5- Injuries 6- Domestic violence 7- Disability 8- Smoking and addiction 9- Urban services including responsiveness, waste management, and public transport 10- Chronic diseases 11- Household costs 12- Nutritional habits 13- Food Security Scale (24) 14- Healthcare utilization
Individual questionnaires	1600 individuals in each 22 districts; 8 individuals in each block	34700 individuals in four age groups	15- General Health Questionnaire (GHQ-28 for mental health) (25) 16- Short Form-12 (for quality of life) (26) 17- Chronic pain questionnaire 18- Social capital questionnaire (27) 19- Oral health tool 20- Physical activity questionnaire (GPAQ) (28)
Nutrition questionnaire	200 households in each 22 district; one household in each block	4400 families	Detailed food frequency questionnaire

economic determinants of health to explore disparities, which eventually affect the health of urban residents at neighborhood level. In the second round of project (2011) we revised the indicators thoroughly to cover more social factors and more health outcomes. In addition, findings were disaggregated by all neighborhoods, either with direct estimation or using statistical models to report inequalities to all 'neighborhood councils' so as to respond appropriately.

The second round of Urban HEART had three major differences from the previous round:

1. We collected SDH data disaggregated by all 374 neighborhoods of Tehran,
2. Secondly, the social health workers affiliated to the municipality were involved in the project, responsible for data collection and implementing appropriate interventions;
3. More importantly, the focus of second

round of Urban HEART project in Tehran was on 'response' part, which targets community-based interventions to tackle disparities.

#### *Local implications*

During 2012 we explained the importance of findings and the role of all 22 district municipalities and relevant local authorities (including district mayors' deputies, zone mayors, neighborhood managers and neighborhood councils) to encourage them implementing the 'response' part across all neighborhoods. A briefing meeting was held in each 22 districts to present local data, highlight disparities in neighborhoods, triangulate UH data with local data, discussing over interested issues and explain the methods for community-based and intersectoral implementation. Local councils were then envisaged to:

- prioritize local problems according to the findings of assessment section,

Table 4. General characteristics of sampling framework across 22 districts of Tehran

District	Population	Number of neighborhoods	Number of assigned blocks	Range of neighborhood population		Range of neighborhood blocks		Sampling households	Sampling population	Incomplete questionnaires (%)
				min	max	min	max			
1	379962	26	193	2719	36037	2	20	1542	4993	56 (3.5)
2	608814	30	200	1730	42209	1	14	1597	5478	0
3	290726	12	197	12598	44292	9	31	1570	5009	24 (1.5)
4	822580	20	191	6284	44292	7	19	1526	5436	72 (4.5)
5	679108	29	191	4143	53234	2	14	1525	5397	72 (4.5)
6	237292	18	192	735	57692	1	44	1530	4951	64 (4)
7	310184	19	195	4612	27723	3	18	1557	5092	40 (2.5)
8	378725	13	192	16544	48072	9	25	1534	4996	64 (4)
9	165903	8	188	168	32860	2	40	1501	5121	96 (6)
10	315619	10	194	24060	47745	15	29	1545	5059	48 (3)
11	275241	13	187	8894	24811	6	18	1491	5040	104 (6.5)
12	248048	17	198	5930	30553	5	26	1580	5515	16 (1)
13	245724	13	188	1823	32647	2	26	1499	5111	96 (6)
14	483432	26	185	5816	52411	3	20	1476	5087	120 (7.5)
15	644259	20	200	16571	75229	6	22	1596	6094	0
16	291169	9	191	11323	54106	8	37	1527	5348	72 (4.4)
17	256022	14	198	547	38122	1	31	1584	5589	16 (1)
18	317188	16	214	4198	41326	3	24	1712	6492	-112*
19	249786	13	187	1108	29457	1	23	1496	5709	104 (6.5)
20	335634	22	204	4465	50995	3	30	1631	6143	-32*
21	159793	17	198	107	33727	1	38	1584	5814	16 (1)
22	108674	9	142	2532	18597	5	33	1131	4371	464 (29)**
Total	7803883	374	4217					33734	117845	56 (3.5)

\*More blocks and households in districts 18 and 20 were recruited to cover slum areas in both districts.

\*\* District 22 is a quite new and the least populated district in Tehran. Also there are two non-residential neighborhoods in this district which convinced the steering committee to diminish the sample size, which ended in 142 blocks (1131 households).

- prepare ‘community based’ programs to meet the local needs,
- organize the community for advocating physical activities in daily schedule of the people,
- establish the intersectoral coordination at local level through ‘neighborhood development committee’ (NDC),
- promote the accountability of local councils, and
- develop transparent planning and resource allocation within neighborhoods.

#### *Neighborhood Development Committee (NDC) roles and organization*

Neighborhood Development Committee which constitutes local key members and influential individuals were established in all 368 neighborhoods, where the assessment part was conducted, chaired by the neighborhood manager. These key people are including, but not limited to neighborhood manager, representatives of six neighborhood working groups, director of neighborhood health house, neighborhood social worker, and 1-2 local expert/ scholar selected by the ‘neighborhood council’.

NDC is expected to fulfill the following

roles:

- Choosing ‘transferable’ data to local people;
- Identifying the method of knowledge transfer (local media, face-to-face meetings, etc.);
- Collecting local people viewpoints (as a source of data triangulation);
- Setting up to five social determinants of health priorities to be presented in the neighborhood council;
- Discussing evidence-based solutions (plan of action) which are developed by the relevant working groups for the selected and approved SDH priority.

#### *Resources used for implementation phase 2 of Urban HEART*

The main policy in the second round of Urban HEART and beyond is to institutionalize the whole process within routine responsibilities and tasks of the Municipality of Tehran, therefore all organizations, departments and district municipalities were involved in different parts of Urban HEART-phase 2.

Main funding bodies for implementing Urban HEART-phase 2 were as following:

- Funds from Deputy for Social and Cultural affairs, Municipality of Tehran, which was mainly spent for data collection
- Neighborhood councils funds with limited contributions to host intersectoral team meetings, setting priorities, and develop a local action plan to respond the inequalities; for this particular PA experiences: to promote physical activity within the local community
- Funds by 'districts municipalities' to support the action plans run in different neighborhoods across the district. These funds support intersectoral activities which are mainly implemented in public places such as parks, streets, and local sport areas (all covered by municipality) and local schools (either state or private).
- Voluntary and free of charge services by the auxiliary health workers.

#### *National and regional implications*

By completion of the first round of Urban HEART (16) 52 SDH related indicators in the same policy domains, were endorsed by the Cabinet to monitor health and social determinants across all 400 districts of the country. More than 40 indicators were routinely collected through health and other relevant sectors at national level during 2012 and the remaining 10 indicators such as mental health, healthcare utilization, the prevalence of osteoporosis, body mass index, physical activity, smoking and addiction, and health economic indicators are going to be collected through a national survey disaggregated by all districts in 2013.

As a response to global call to action by WHO (31) the Regional Office of Eastern Mediterranean organized an inter-country workshop in September 2012 consisting of all 22 countries across the region, where UH-2 findings were reviewed to enhance utilization of Urban HEART in at least one city of all regional member states by 2014 (32).

Despite comprehensiveness of Urban HEART-2 as a model for measuring inequalities in social determinants of health, it

suffers from a range of limitations. First of all time limitation to avoid coincidence with national census, compelled the core investigators to conduct the whole process of data collection in 25 days across twenty two districts of Tehran, which led to enormous pressure on field investigators (auxiliary health workers), which in turn made some of them (12%) detaching from data collection process. To substitute detached filed investigators we had to train more eligible persons or to reposition surveyors, which might affect the quality of data collection. Secondly, eight neighborhoods (out of 374) were removed from data collection, due to non-residential and/or military based blocks, where basic data were obtained either through other routine sources or data modeling. Third, detailed questions usually make respondents refrain from completing the questionnaire(s); our investigators also encountered this limitation, however local solutions such as minor rewarding were used to encourage responding, which led to high response rate in most districts. Fourth, questioning process was occurred mostly in day time, which led to a female dominant (>60%) response for individual questionnaires. To overcome gender bias, a random sample was selected, which diminished our total sample size for individual sections to over 25000 cases. Last but not the least, it is highly recommended to build a cohort design either household or 'geographical' cohort to track changes over time. In the second round of Urban HEART we did not follow the same households or blocks due to technical and logistic limitations, however employing local health auxiliaries will allow the investigators to make better records so that they will have access to local participants in the next rounds of the project.

This study protocol demonstrated rationale, concepts, methodological framework, challenges and implications of Urban HEART-2 project in Tehran. Following the first round of Urban HEART project in 2008, the second round was conducted in November 2011, to track changes over

time, to institutionalize inequality assessment within the local government, to build up community participation in 'assessment' and 'response' parts of the project, and to implement appropriate and evidence-based actions to reduce health inequalities within all neighborhoods of Tehran. Results of more than 60 indicators have been disaggregated by 368 neighborhoods of Tehran and endorsed by the Mayor to all local authorities so that appropriate action plans being developed and implemented to tackle inequalities. Urban HEART (Tehran) team endeavors to publish data, particularly from 'equity' point of view, and also to monitor and scrutinize widespread local action plans, which are currently undertaking within all neighborhoods.

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