Planning and Health: Literature Review

We searched the evidence from the literature describing how major infrastructure developments have or might impact upon:

1. mental health and well-being
2. physical health and injury
3. lifestyle and leisure
4. community- making connections
5. environment —nice surroundings
6. housing
7. transport, access and other social infrastructure —getting about
8. nutrition / Access to healthy food
9. education—lifelong learning
10. employment / volunteering —personal wealth
11. economy—wider wealth
12. social and economic factors- Poverty / income

as a cause of ill health. The following summaries what we found and considers whether such impacts might help to close or further widen gaps in health status (if reported)

Scope of searches: Studies included those undertaken in UK or areas likely to be transferable to UK (such as Western Europe, USA/Canada, Aus/NZ etc),

Sources searched: NICE Evidence, Cochrane Library, Medline, PsycINFO, TRIP, HMIC PsycINFO, SocINDEX, Science Direct, Environmental Sciences & Pollution Management, Green File, Environmental Sciences and Pollution Management, Google scholar

1. **Mental health and well-being**: issues around stress, quality of life, control, inclusion, participation, etc.

1.1 The loss of property and land caused by *compulsory purchase / eminent domain takings* could lead to adverse *psychological effects* relating to feelings of sadness and anger and lack of governmental compensation for the emotional loss caused by the taking of property[1]

1.2 Studies exploring the relationship between green space and pregnancy outcomes show a positive association between birth weight and exposure to green space[2] [3], albeit with one study showing the association in only the lowest socioeconomic position[4]

[1] The psychological cost of eminent domain takings and just compensation.
Citation: Law & Psychology Review, Mar 2006, vol. 30, p. 215-228, 0098-5961 (Spr 2006)
Author(s): Powell, Jeffrey T.

[2] 2014 Oct;71:101-8. doi: 10.1016/j.envint.2014.06.010. Epub 2014 Jul 3. Inequality, green spaces, and pregnant women: roles of ethnicity and individual and neighbourhood socioeconomic status.

1.3 Proximity to nearby play and social spaces was associated with better mental health, perhaps through increased opportunity for social interaction[5]

1.4 Quantity and quality of **streetscape greenery** and **greenspace** has a positive effect on self-reported health status[6][7], perceived general health, acute health-related complaints and mental health with stronger relationships associated with quality.[8]

1.5 Green space has been associated with better mental health among men, but not women. The benefit for men being in early to mid-adulthood[9]

1.6 Green space has been shown to provide a buffer against the negative health impacts of stressful life events[10]

1.7 The percentage of green space in people's living environment has a positive association with the perceived *general health* of residents. The elderly, youth and secondary educated people in large cities seem to benefit more from presence of green areas in their living environment than other groups in large cities[11]

2. Physical health and injury: issues around personal mobility/ physical disability, personal safety on public transport, risk of injury or accident, etc.;

2.1 More disadvantaged areas tend to have a higher density of roads and traffic, leading to higher collision rates[12]

Dadvand P1, Wright J2, Martinez D3, Basagaña X3, McEachan RR2, Cirach M3, Gidlow CJ4, de Hoogh K5, Gražulevičienė R6,Nieuwenhuijsen MJ3.

[3] Occup Environ Med. 2014 Aug;71(8):562-9. doi: 10.1136/oemed-2013-101961. Epub 2014 Apr 23. Green spaces and adverse pregnancy outcomes.
Agay-Shay K1, Peled A2, Crespo AV1, Peretz C3, Amitai Y4, Linn S5, Friger M6, Nieuwenhuijsen MJ1.

[4] Environ Int. 2012 Apr;40:110-5. doi: 10.1016/j.envint.2011.07.004. Epub 2011 Aug Green space, health inequality and pregnancy.
Dadvand P1, de Nazelle A, Figueras F, Basagaña X, Su J, Amoly E, Jerrett M, Vrijheid M, Sunyer J, Nieuwenhuijsen MJ.

[5] Beyond proximity: the importance of green space useability to self-reported health.
Citation: EcoHealth, Sep 2014, vol. 11, no. 3, p. 322-332 (September 2014)
Author(s): Carter, May, Horwitz, Pierre

[6] Streetscape greenery and health: stress, social cohesion and physical activity as mediators.
de Vries S1, van Dillen SM, Groenewegen PP, Spreeuwenberg P.

[7] Greenspace in urban neighbourhoods and residents' health: adding quality to quantity (2012) van Dillen, SM et al

[8] Streetscape greenery and health: stress, social cohesion and physical activity as mediators.
de Vries S1, van Dillen SM, Groenewegen PP, Spreeuwenberg P.

[9] The association between green space and mental health varies across the lifecourse. A longitudinal study.
Citation: Journal of epidemiology and community health, Jun 2014, vol. 68, no. 6, p. 578-583 (June 2014)
Author(s): Astell-Burt, Thomas, Mitchell, Richard, Hartig, Terry

[10] Green space as a buffer between stressful life events and health. Van Den Berg A et al Social Science & Medicine. Apr2010, Vol. 70 Issue 8, p1203-1210

[11] Green space, urbanity, and health: how strong is the relation?
Citation: Journal of Epidemiology and Community Health, 2006, vol./is. 60/7(587-592), 0143-005X
Author(s): Maas, Jolanda, Verheij, Robert A, Groenewegen, Peter P, De Vries, Sjerp, Spreeuwenberg, Peter

[12] Transport and Health - briefing statement. Faculty of Public Health, December 2013

3. Lifestyle and leisure: effects on behaviours (physical activity, healthy food choice, smoking, drinking), access to green space (new open space or improve existing spaces), open spaces welcoming and safe, links between arts and culture, play spaces for young people.

3.1 *Green Spaces* The overall conclusion of the research regarding health and green space is that green space has positive effects on both physical and mental health.

3.11 Living near parks, woodland or other open spaces helps to reduce health inequalities, regardless of social class[13]

3.12 Perceived distance from home to green/open spaces has been shown to be associated with more weekly TV viewing time, worse mental health and general health for children (5.9 years) living the furthest distance from green/open spaces[14]

3.13 *Proximity* to nearby play and social spaces was associated with better mental health, perhaps through increased opportunity for social interaction[5]

3.14 Use of green space may be determined by a variety of factors, including *physical distance* to access green space, as well as perceptions and understandings of what is being accessed (e.g. a place to exercise or a place to socialise) and how it should be used[15]

3.15 Green space use has been associated with better general health and vitality, possibly because positive perceptions of green space quality encouraged and enabled regular visitation, which in itself, was associated with greater vitality[8]

3.16 The percentage of green space in people's living environment has a positive association with the perceived general health of residents. The elderly, youth and secondary educated people in large cities seem to benefit more from presence of green areas in their living environment than other groups in large cities[7]

3.2 Quality or quantity of Public Open Spaces (POS)

3.21 Research from America suggests that neighbourhoods with more African- American, Hispanic and lower income residents generally lack key walkability features, and that these populations have limited access to high-quality parks and recreational space. [16]

[13] Green space, psychological restoration, and health inequality. Citation: The Lancet, November 2008, vol./is. 372/9650(1614-1615), 0140-6736 Author(s): Hartig, Terry

[14] Mothers' perceived proximity to green space is associated with TV viewing time in children: the Growing Up in Scotland study. Prev Med. 2015 Jan;70:46-9. doi: 10.1016/j.ypmed.2014.11.018. Epub 2014 Nov 28. Aggio D1, Smith L2, Fisher A3, Hamer M4

[15] Multidisciplinary research in public health: a case study of research on access to green space. Citation: Public Health, January 2009, vol./is. 123/1(32-8), 1476-5616 Author(s): Kessel A, Green J, Pinder R, Wilkinson P, Grundy C, Lachowycz K

[16] Taylor, W.T., Lou, D. 2011. "Do All Children Have Places to Be Active? Disparities in Access to Physical Activity Environments in Racial and Ethnic Minority and Lower-Income Communities." Active Living Research / Research Synthesis. www.activelivingresearch.org/files/Synthesis_Taylor-Lou_Disparities_Nov2011.pdf

3.22 Residents of neighbourhoods with high quality POS had lower psychosocial distress than residents with low quality POS. Quality of POS, appears to be more important that POS quantity for mental health[17]

3.3 Physical activity

3.31 Walking and cycling are effective ways of integrating, and increasing, levels of physical activity into everyday life for the majority of the population, at little personal or societal cost[18].

3.32 Reasonably consistent associations exist between physical activity and access to physical activity facilities, convenient and proximate access to destinations, high residential density, land use and urban 'walkability' scores. There were also reasonably consistent associations between perceived safety, exercise equipment, pavement ('sidewalks') and physical activity participation. Less clear associations were noted for aesthetic features of the environment, parks, and perceived crime [19] (ADULTS ONLY?)

3.33 Higher rates of crime and violence, lack of access to play areas and parks and greater traffic-related risks due to busy streets and poor bicycle and pedestrian infrastructure as key factors influencing physical activity levels in low income communities.[20]

3.34 Consistent associations between physical activity in ***children*** and the environment were the provision of pavements, destinations to walk to, few intersections to cross and low road traffic hazards. Aspects of the recreation infrastructure were also found to be strongly associated with increased levels of activity, these included proximity to, and availability of parks, playgrounds, and recreation areas.[17]

3.35 Fairly strong evidence exists for positive association between greenness and physical activity[21]

3.36 Provision of good access to green spaces in urban areas and may help to promote population physical activity[22], conversely one study in middle aged adults showed no evidence of clear relationships between levels of physical activity and access to green spaces[23] & a Danish study found no association between outdoor physical activity and size, distance and number of features in the nearest urban green space[24]

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[17] Quality or quantity? Exploring the relationship between Public Open Space attributes and mental health in Perth, Western Australia. Social Science & Medicine. May 2012, Vol. 74 Issue 10, p1570-1577 Francis J et al

[18] British Medical Association healthy transport = healthy lives 2012

[19] Environmental Correlates of Physical Activity And Walking in Adults and Children: A Review of Reviews Bull A and Bauman F NICE, Feb 2007

[20] Urban Pathways to Healthy Neighbourhoods – Promising Strategies for Encouraging Trail Use in Urban Communities

[21] 2015 Jun;2(2):131-142.**A Review of the Health Benefits of Greenness.** James P[1], Banay RF[2], Hart JE[3], Laden F[4].

[22] The relationship of physical activity and overweight to objectively measured green space accessibility and use. 2010 Mar;70(6):816-22. doi: 10.1016/j.socscimed.2009.11.020. Epub 2010 Jan 8.

[23] The relationship between access and quality of urban green space with population physical activity. Citation: Public Health, 2006, vol./is. 120/12(1127-1132), 0033-3506 Author(s): Hillsdon, M., et-al

[24] Associations between physical activity and characteristics of urban green space. Urban Forestry & Urban Greening. Feb 2013, Vol. 12 Issue 1, p109-116 Schipperijn, J et al

3.37 Large-investments to enhance green spaces may promote moderate and vigorous physical activity and reduce sedentary behaviour in middle- to-older aged adults, but the impact on obesity may not benefit everyone to the same extent[25]

3.38 To promote health to suburban residents, green spaces close to home are important. In residential areas, green spaces should consider safe walking and cycling, in association with commuting to increase physical activity[26]

3.39 Playground renovation made no significant difference to moderate or vigorous physical activity among children[27]

3.4 Physical Activity - What works?

3.41 Evidence-based recommendations on how to improve the physical environment to encourage physical activity can be found at in the National Institute for Health and Care Excellence Guidance on Physical activity and the environment at http://www.nice.org.uk/guidance/ph8

3.42 Data from a study exploring perceptions of accessible and safe physical activity as related to socio-economic status (SES) report that low-SES participants experienced an increase in physical activity when facilities like trails were available[28]

3.43 In a review of studies examining the built environment correlates of walking, factors such as aesthetic quality, or attractiveness of the surrounding environment, and connectivity of pedestrian networks were shown to be correlated with walking[29]

3.44 Some research suggests it may be useful to promote the health and exercise benefits of recreational trail use to increase trail activity[30]

3.5 Public Art

3.51 The evidence from the literature did not uncover links between arts and heath. However Crawley Borough Council have produced a useful Supplementary Planning Guidance Note on Public Art which can be found at:

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[25] Int J Obes (Lond) 2014 Vol 38 (1) pg 156-159 Greener neighborhoods, slimmer people? Evidence from 246,920 Australians. Astell-Burt T1, Feng X2, Kolt GS3

[26] Relationships between exposure to urban green spaces, physical activity and self-rated health Journal of Outdoor Recreation and Tourism Volume 10, July 2015, Pages 44–54 Pietila M et al

[27] Does playground improvement increase physical activity among children? A quasi-experimental study of a natural experiment. Citation: Journal of environmental and public health, Jan 2013, vol. 2013, p. 109841. (2013) Author(s): Bohn-Goldbaum, Erika E, Phongsavan, Philayrath, Merom, Dafna, Rogers, Kris, Kamalesh, Venugopal, Bauman, Adrian E

[28] Doyle, S., Kelly-Schwartz, A., Schlossberg, M., Stockard, J. 2006. "Active Community Environments and Health: The Relationship of Walkable and Safe Communities to Individual Health." Journal of the American Planning Association, 71(1): 19-31.

[29] Saelens, B. E., Handy, S. L. 2008. "Built Environments Correlates of Walking: A Review." Med Sci Sports Exerc. 40.

[30] Dunton, G.F., Spruijt-Metz, D., Wolch, J., Chou, C., Jerrett, M., Byrne, J., Weaver, S., Reynolds, K.D. 2009. "Reasons for Urban Trail Use Predict Levels of Trail-Related Physical Activity." Journal of Physical Activity and Health, 6, 426–434.

http://www.crawley.gov.uk/pw/Planning_and_Development/Planning_Policy/Local_Development_Framework/Supplementary_Planning_Documents_and_Development_Briefs/INT131526

4. Community - making connections: issues around community activities, social capital, social, crime reduction and community safety, inclusion, cohesion, resilience, shared local assets, etc.;

4.1 The loss of property and land caused by *compulsory purchase / eminent domain takings* could lead to adverse psychological effects associated with the community that provided a sense of safety, comfort and identity.[1]

4.2 Less green space in people's living environment can coincide with feelings of loneliness and with perceived shortage of social support[31]

4.3 More disadvantages areas tend to have a higher density of roads and traffic, which can cause community severance[11]

4.4 Some studies show moderate associations between perceived safety and physical activity[32]

4.5 Crime and the perception of crime-related safety are both individual and social-level factors affecting physical activity [2833]. In an examination of the relationship between walkable, safe environments and indicators of health in urban areas, researchers found that participants in areas with higher crime rates walked less often, with crime-related safety more adversely affecting walking rates among women than men[28]

4.6 Efforts to increase perceived safety, accessibility and awareness of a trail may result in increased and more frequent trail use[34]

5. Environment —nice surroundings: issues around pollution (esp. air, water, noise), flood risk, climate change, sustainable design and construction techniques, construction waste & recycling, effect on wildlife, aesthetics/landscape severance,

5.1 Air Pollution

5.11 Long-term exposure to air pollutants, particularly small particles (PNM2.5, PM10), from road traffic has been found to decrease life expectancy by an average of six months, due to an increased risk of cardiovascular morbidity and mortality[1218]

5.12 Prenatal exposure to air pollution is associated with a number of adverse outcomes in pregnancy[1218]

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[31] Social contacts as a possible mechanism behind the relation between green space and health.
Citation: Health & Place, 01 June 2009, vol./is. 15/2(586-595), 13538292
Author(s): Maas J, van Dillen SM, Verheij RA, Groenewegen PP

[32] Environmental Correlates of Physical Activity And Walking in Adults and Children: A Review of Reviews Bull A and Bauman F NICE, Feb 2007

[33]Wilson D.K., Kirtland, K.A., Ainsworth, B.E., Addy, C.E. "Socioeconomic Status and Perceptions of Access and Safety for Physical Activity." Annals of Behavioral Medicine, 28(1), 20–28.

[34] Wolch, J.R., Tatalovich, Z., Spruijt-Metz, D., Byrne, J., Jerrett, M., Chou, C., Weaver, S., Wang, L., Fulton, W., Reynolds, K. 2010. "Proximity and perceived safety as determinants of urban trail use: findings from a three-city study." Environment and Planning, 42, 57–79.

5.13 Individuals with pre-existing circulatory and/or respiratory disease and the very young and the very old are much more susceptible to the acute effects of air pollution[12]

5.14 A review of this evidence indicates that transport-related air pollution contributes to an increased risk of death, particularly from cardiopulmonary causes[3536]. It increases the risk of respiratory symptoms and diseases that are not related to allergies[35]

5.15 Studies indicate an increased risk of various types of cancer in people with prolonged exposure to higher levels of transport-related air pollution[35]

5.16 Evidence shows the adverse effects of pregnancy, birth outcomes and a male fertility also seem to be affected by transport related air pollution, although the number of studies is small[35]

5.2 Noise Pollution

5.21 Transport-related noise pollution (predominantly from roads, railways and airports) can adversely affect the cardiovascular system (including increasing blood pressure and myocardial infarction), mental health and school performance in children[1218]

5.22 Socially disadvantaged people are more likely to live near busy roads and are at greater risk of the negative effects of noise pollution[1218]

5.23 One study showed that traffic related air pollution and noise were both associated with heart rate variability (HRV) in young healthy adults, and the effects of air pollutants were amplified at high noise level [37] (Links to cardiovascular diseases)

5.24 One study showed that a significant exposure – effect relationship between noise levels from road traffic across a number of sleep parameters for children and adults[38]

5.25 One study indicated no significant associations between road traffic noise and obesity in the total population. Road traffic noise was however positively associated with obesity markers among highly noise sensitive women[39]

5.26 One study showed that traffic noise exposure, even at low levels, was associated with annoyance and sleep disturbance. Access to a quiet side seemed to be a major protective factor for noise related problems[40]

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[35] Health effects of transport-related air pollution Krzyzanowski M, Kuna-Dibbert B, Schneider J, eds (2005). WHO Regional Office for Europe

[36] An epidemiological appraisal of the association between heart rate variability and particulate air pollution: a meta-analysis Pieters N et al Heart 2012; Vol 98, No 15 pg 1127-1135

[37] The impacts of short-term exposure to noise and traffic-related air pollution on heart rate variability in young healthy adults. Huang J, Deng F, Wu S, Lu H, Hao Y, Guo X (2013) 2013 Volume 23 Issue 5 Pages 559-64

[38] Effects of road traffic noise on sleep: Studies on children and adults. Öhrström, Evy Journal of Environmental Psychology. Jun2006, Vol. 26 Issue 2, p116-126.

[39] Road traffic noise and markers of obesity – A population-based study. Oftedal, Bente et al Environmental Research. Apr2015, Vol. 138, p144-153

[40] Road Traffic Noise and Annoyance - An increasing Environmental Health Problem Noise and Health 6.24 (Sep 2004): 43-49. Bluhm G et al

5.27 One study showed that traffic noise exposure, even at low levels, was associated with annoyance and sleep disturbance. Access to a quiet side seemed to be a major protective factor for noise related problems[41]

5.28 One study showed that noise sensitivity did not show main effects on CVD morbidity or mortality but did predict angina pectoris in low employment grades and the risk of future psychological distress[42]

5.3 Inequalities in air and noise pollution

5.31 More disadvantaged areas tend to have a higher density of roads and traffic, leading to impaired air quality and higher noise levels[1218]

5.4 What works? Noise Pollution

5.41 Moderate evidence exists that the presence of vegetation can generally reduce the perception of noise[43]

5.42 One study found that using a scale model to measure the noise reduction in residential buildings by vegetation and found that vegetated facades reduced noise by less than 2 dB at pedestrian level in a two lane street canyon[44]

5.5 What works? Air Pollution

5.51 Tree planting schemes in urban areas such as the can make a positive contribution to air quality bringing additional benefits to human health[45]

5.52 Studies indicate that reduced air pollution may directly reduce acute asthma attacks in children and also the medical care associated with these attacks. Long-term decreases in air pollution are associated with declines in bronchial hyperreactivity, in the average annual trend in deaths from all causes and in respiratory and cardiovascular diseases[37]

5.53 Traffic management is one of the instruments that can significantly reduce the exposure of residents of urban areas. In addition, the integration of environmental and health considerations into urban planning can be improved. In particular, urban planning may aim at integrative measures

[41] Road Traffic Noise and Annoyance - An increasing Environmental Health Problem Noise and Health 6.24 (Sep 2004): 43-49. Bluhm G et al

[42] Noise sensitivity and future risk of illness and mortality. Stansfeld, S.A. et al Science of the Total Environment. Jul2015, Vol. 520, p114-119

[43] Urban green spaces' effectiveness as a psychological buffer for the negative health impact of noise pollution: a systematic review. Noise Health. 2014 May-Jun;16(70):157-65. doi: 10.4103/1463-1741.134916. Dzhambov AM1, Dimitrova DD

[44] Scale-model method for measuring noise reduction in residential buildings by vegetation.
Jang, Hyung Suk et al Building & Environment. Apr2015, Vol. 86, p81-88.

[45] An integrated tool to assess the role of new planting in PM10 capture and the human health benefits: A case study in London
Citation: Environmental Pollution, October 2009, vol./is. 157/10(2645-2653), 0269-7491
Author(s): Tiwary A., Sinnett D., Peachey C., Chalabi Z., Vardoulakis S., Fletcher T., Leonardi G., Grundy C., Azapagic A., Hutchings T.R.

that lower emission rates, such as the promotion of highly efficient, service-oriented and clean public transport and improvements in the flow of traffic[35]

5.54 Particle traps, preheated catalytic convertors, stricter exhaust emission legislation, alternative vehicle technologies, fuel substitutes, may have an impact on transport related air pollution. However, many of the positive effects of technological improvements risk being offset by an increase in the number of vehicles, of the number of kilometres travelled, by a trend towards replacing smaller vehicles with more powerful engines and an by increased use of diesel fuel. Thus, technological improvements alone may be insufficient and why there is also a need to consider measures that influence the amount of travel. For example, integrated urban planning, such as zoning offices, green areas and non-residential functions around urban highways, separating pedestrians and bicyclists from road traffic, and introducing measures that provide disincentives to using private vehicles (such as parking fees and congestion charges) seem to contribute to lowering emission rates[35]

6. Housing : issues around affordable/good quality housing and range of housing types and sizes, high energy efficient homes lifetime homes standards or building M4 regulation, independent living, forced sales/relocation, value of capital assets, living conditions, etc.;

6.1 The loss of property and land caused by *compulsory purchase* could lead to adverse psychological effects relating to feelings of sadness and anger and lack of governmental compensation for the emotional loss caused by the taking of property[1]

7. Transport, access and other social infrastructure —getting about: changes to road use/ local bus services, active travel, affordability of rail fares, physical severance, access to health (especially GPs, hospital, pharmacy) and social services plus other key amenities, shared community use or co-location of services, meets primary, secondary and post 19 education needs etc.;

7.1 Active forms of travel, such as walking and cycling, are the most sustainable forms of transport and are associated with a number of recognised health benefits. These include improved mental health, a reduced risk of premature death, and prevention of chronic diseases such as coronary heart disease, stroke, type 2 diabetes, osteoporosis, depression, dementia, and cancer[18]

7.2 Using public transport can help individuals to achieve recommended levels of daily physical activity by incorporating active travel as a component of the journey. It is also viewed as the most sustainable transport option for longer journeys because it emits less harmful emissions at average occupancy compared to car use[18]

7.3 One study showed that significant positive associations to psychological wellbeing were found between:

- active travel and public transport, when compared to car travel
- time spent walking, when compared to driving
- switching from car travel to active travel[46]

[46] Does active commuting improve psychological wellbeing? Longitudinal evidence from eighteen wave of the British Household Panel Survey Martin A et al (2014)

7.4 One study showed that switching from private motor transport to active travel or public transport was associated with a significant reduction in BMI compared with continued private motor vehicle use and that switching from active travel or public transport to private motor transport was associated with a significant increase in BMI. [47]

7.5 One study of a bicycle sharing system (cycle hire) in London, showed benefits reflecting reductions in diseases affected by physical inactivity. These modelled benefits were larger than either observed or modelled changes to injuries, whereas changes in exposure to air pollution were small.[48]

8. Nutrition / Access to healthy food—Supply of local food i.e. allotments, range of retail users, avoids over concentration of hot food takeaways, food and farming: effects on growing/ selling/ buying food and managing crops or livestock, etc.

9. Education—lifelong learning: access to educational opportunities from preschool to university and adult education;

10. Employment / *volunteering* —personal wealth: access to paid or unpaid employment, personal income, childcare facilities, managed and affordable workspace etc.;

11. Economy—wider wealth: investment opportunities, effects on footfall, economic growth potential, creating jobs, etc.

11.1 Resettlement following compulsory purchase can cause special problems for traders, small businesses, street vendors, cottage industries, and others through the disruption of commercial ties with customers, suppliers and distributors[49]

12. **Social and economic factors**- Poverty / income

12.1 The loss of property and land caused by compulsory purchase / eminent domain takings could lead to adverse psychological effects relating to the *lack of governmental compensation* for the emotional loss caused by the taking of property[1], causing *increased poverty* if the owners and tenants are not adequately compensated[49]

12.2 Government compulsory purchase poses severe threats to private properties in that the possible beneficial uses and exchange value of a property are adversely affected[49]

[47] Impact of changes in mode of travel to work on changes to body mass index: evidence from the British Household Panel Survey (2015) Adam Martin et al
[48] Modelled Health Impacts of the London Cycle Hire Scheme (2013); Goodman, A et al
[49] Decision-making of property owners and tenants in the face of **compulsory purchase** Lin, Tzu-Chin et al Habitat International. Sep2006, Vol. 30 Issue 3, p434-447