



# ASSESSING HEALTH IN HAITI

## A POLICY BRIEF

### EXECUTIVE SUMMARY

With the **lowest health indicators** in the western hemisphere, Haiti increasingly faces a **double burden** of disease. Non-communicable disease (NCD) mortality rates from stroke and ischemic heart disease (IHD) have taken over the communicable diseases (CD) of lower respiratory infection (LRI) and human immunodeficiency virus (HIV). In particular, the growing prevalence and poor control of **hypertension** is a key factor contributing to the rising NCD epidemic. Based on the evidence accumulated from **22 systematic reviews**, recommended cost-effective policies include: **1)** training non-physician healthcare workers (NPHW) in administering Antiretroviral Therapy (ART) and high blood pressure care, **2)** integrating NCD care into existing HIV AIDs vertical infrastructure, **3)** using school and community platforms to establish education-based interventions to promote healthy lifestyles and comprehensive sexuality education, and **4)** expanding rotavirus, *H influenzae* type b, and pneumococcal conjugate vaccination campaigns.



# Haiti's Health in Numbers

Similar to most low income countries (LIC), Haiti has observed considerable progress in numerous health indicators, largely due to decreases in infectious disease mortality rates (Fene et al. 2020). Despite increases in life expectancy and decreases in child and maternal mortality rates, Haiti's healthcare system has the lowest health indicators in the Western Hemisphere (PAHO). In addition to the highest rates of malnutrition and persons living with HIV/AIDs in the Western Hemisphere, Haiti's under-5 mortality rate is the region's highest, with **58.4 per 1,000 live births** compared to the Latin America/Caribbean (LAC) 18.3 average in 2015 (Fene et al., 2020). Haiti's maternal mortality rate (**520.8 per 100,000 live births**) was 7 times larger than the region's in 2015 (Fene et al. 2020). There are also fewer hospital beds and public health infrastructure compared to neighboring countries with **0.71 beds per 1,000 people** in 2013 compared to a LAC average of 1.90 (World Bank). Public healthcare spending constitutes **~9.4%** of the GDP, with **90%** of the health budget allocated to personnel payments (HPP 2016).

The 2010 earthquake devastated the already vulnerable public health system, destroying **~60%** of health facilities and resulting in a **~10%** loss of medical workers (Skolnik 2016a). As a result, **~70%** of healthcare services are provided by non-Haitian organizations and the country faces the severe problems of poor infrastructure, accessibility, personnel, and poverty (Baptiste et al. 2018).

To mitigate Haiti's growing **double burden of disease**, health system investment and preventative action is urgently needed. The following brief outlines key findings and evidence based policy recommendations to halt the growing NCD epidemic and further reduce HIV AIDs and LRI burdens in Haiti.

## PROGRESS

- Under-5 mortality rate: **53.6% decline** (1990-2019)
- Under-1 mortality rate: **48.8% decline** (1990-2019)
- HIV/AIDs mortalities: **44.6% decline** (2009-2019)
- LRI mortalities: **4.8% decline** (2009-2019)

## WARNINGS

- IHD mortalities: **26% increase** (2009-2019)
- Stroke mortalities: **20.9% increase** (2009-2019)
- Hypertension: **30.4% increase** (2009-2019)
- High fasting plasma glucose: **33.9% increase** (2009-2019)

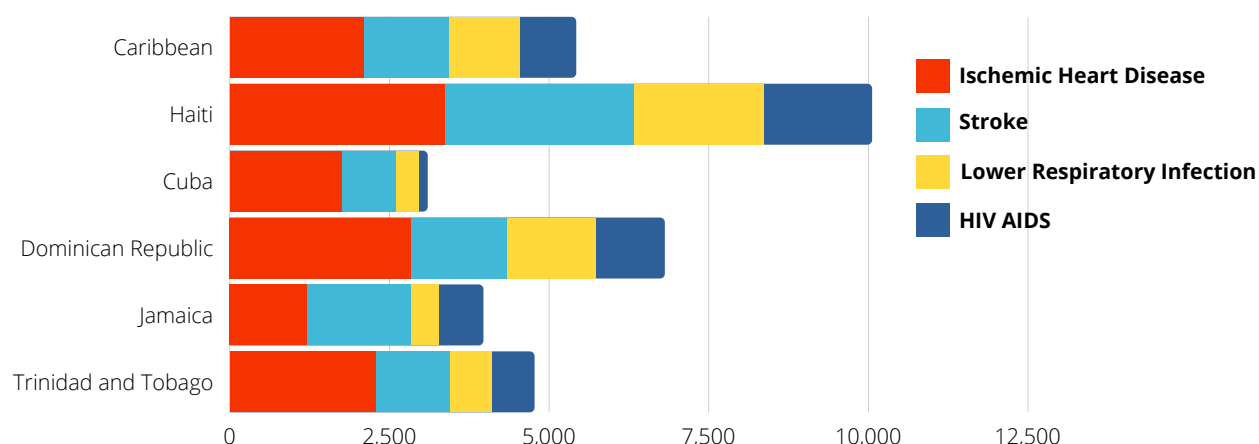


Fig. 1: Years of Lives Lost (YLL) per 100,000 People by Disease (data from: Fene et al. 2020)

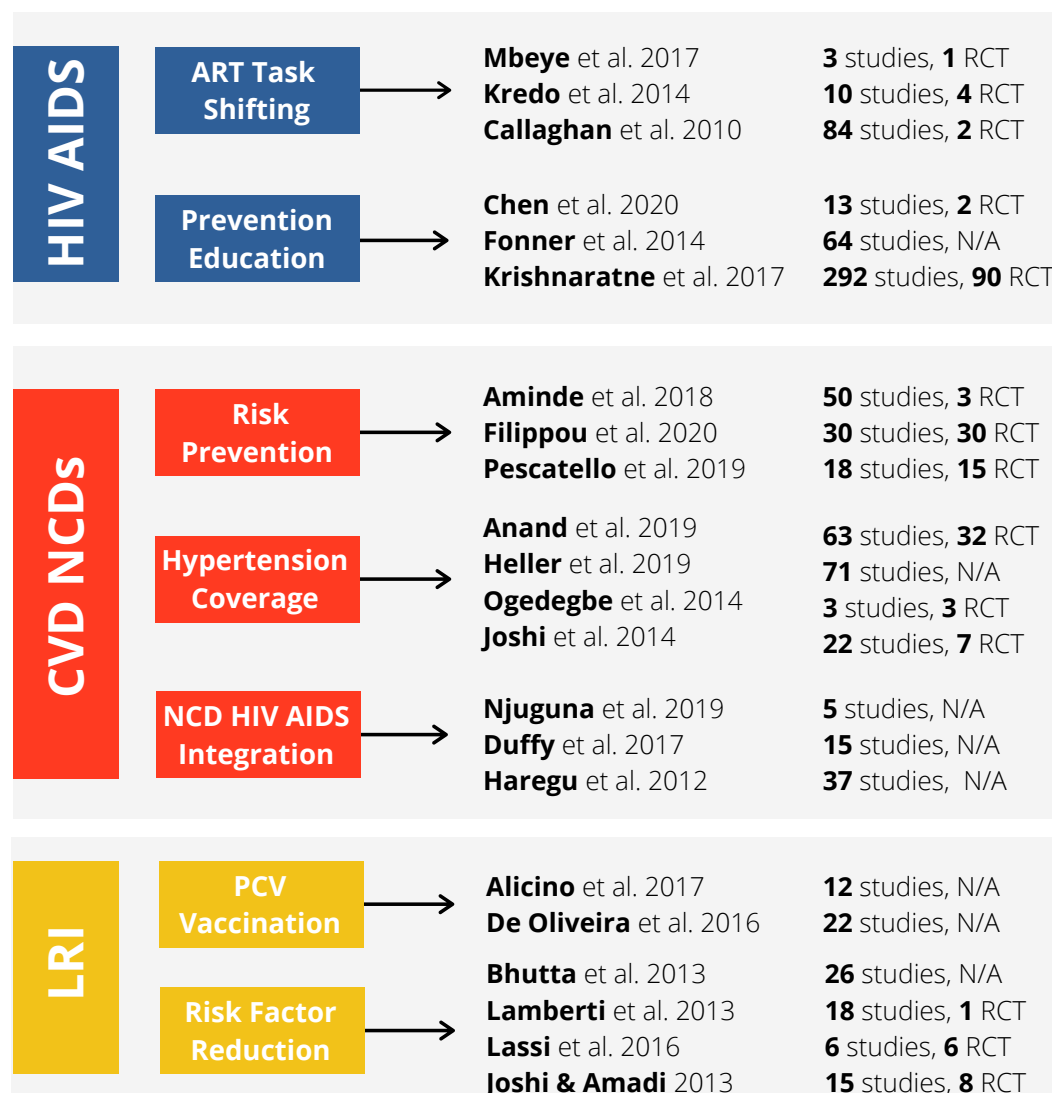


## INTRODUCTION



# Methods

The data included in this brief only stems from **systematic reviews** to help reduce bias from single studies, prioritizing reviews that included **randomized control trials (RCT)** (*a trial where participants are randomly put into a control or treatment group to test an intervention*).



**Fig. 2:** Overview of Systematic Reviews Incorporated

A list of the systematic reviews used to support the policy recommendations beginning on page 6 is shown in Fig. 2. In total, the key findings and policy recommendations were based on evidence from **22 systematic reviews**, which evaluated a total of **879 studies**, around **204** of which were **RCTs**. The reviews were found by searching various electronic databases: PubMed, Google Scholar, Cochrane, Embase. To increase the relevancy of the evidence, only reviews published after 2010 were included. As RCTs are widely considered to be the gold standard of research data, the reviews that analyzed more RCTs and the topics with more RCT evidence may increase the quality of the recommendations.

# Key Findings of Health in Haiti

## I. Communicable diseases: Progress but far from managed

HIV AIDs and Lower Respiratory Infection (LRI) are the two communicable diseases (CD) that cause the most deaths in Haiti. Advances in Antiretroviral Therapy (ART), vaccination, and anti-biotic programs have significantly reduced their impact at a population-level. Still, as a regional leader in HIV AIDs and LRI mortalities, the expanded coverage of cost-effective preventative and relief care is needed.

### HIV AIDs

- **Risk factors:** Unprotected sex, mother to child transmission, unclean needles.
- **Women (15-49):** highest **HIV** prevalence, highest among female sex workers (4.3%).
- Haiti **lacks CSE** (comprehensive sexuality education).
- Just **37%** of 15-24 year-olds have HIV prevention knowledge.
- **Uneven HIV/AIDS funding:** 22% of health spending, 9% of deaths in 2013.

### Lower Respiratory Infection

- **Risk factors:** malnutrition, smoke, indoor air pollution, poor water, sanitation and hygiene (WASH).
- Most common cause of death in children **under 5** in Haiti.
- Bacterial **pneumonia** (caused by the *s. pneumoniae* bacteria): leading cause of LRI mortality in Haiti.
- Pneumococcal conjugate vaccine (PCV13) initiated in 2018; **42%** coverage in 2019.

### Antiretroviral Therapy (ART)

Providing ART to HIV-infected pregnant women is a cost-effective way to prevent mother-to-child-transmission and reduce infant mortality, as infected newborns have higher LRI mortality rates (Skolnik 2016). At-risk communities, such as female sex workers, should be specifically targeted for treatment (Skolnik 2016).

### Community Detection and Treatment

There is considerable evidence supporting the efficacy and cost-effectiveness of training non-physicians to handle HIV care and ART treatment in community settings (Kredo et al. 2014). Decentralizing HIV care at the community level has been shown to increase retention and adherence to ART (Njaguna et al. 2018).

### Leveraging Care

HIV is disproportionately funded compared to its disease burden. Evidence shows that using existing systems (screening, home care delivery, routine monitoring, education) to increase NCD care is effective (Duffy et al. 2017).

### Targeting Risk Factors

**Exclusive breast-feeding** (even for HIV infected mothers) is highly recommended for at least 5-6 months to mitigate malnutrition (Bhutta et al. 2013). The relative risk of pneumonia prevalence was found to be 5.45 higher for partially compared to exclusively breast fed infants (0-5 month); continuing until 23 months also shows decreased pneumonia risk (Lamberti et al. 2013).

**Zinc Supplementation** in the diets of children between 2 months and 5 years is another preventative measure to reduce malnutrition risks. A review of 6 RCTs found that daily zinc supplements reduced pneumonia prevalence by 41% and incidence by 13% (Lassi et al. 2016).

**Improving WASH services** is widely cited as a key measure to prevent LRI (Piper et al. 2017). Studies have found that WASH interventions, such as personal hygiene education, led to a 21% decrease in LRI (Freeman et al. 2014). Evidence shows that school settings are effective for WASH education and behavior interventions and can increase school attendance (Joshi & Amadi 2013).

## II. The Epidemiological Transition to Cardiovascular Non-communicable Diseases

Reflecting a **global trend** in LICs, Haiti is burdened by both CD and NCDs, with ischemic heart disease and stroke now the main causes of death (Fene et al. 2020). Despite increases in NCDs, health systems have continued to focus on CD relief, NCD care lacking investment and resources (Baptiste et al. 2020). This brief focuses on **hypertension (HT)** (high blood pressure) when addressing cardiovascular (CV) NCDs, as it is a key risk factor for ischemic heart disease and stroke in Haiti, accounting for **70%** of CVD hospital admissions in 2014 (Baptiste et al. 2018). HIV positive adults are particularly vulnerable to HT, doubling their mortality risk (Walsh et al. 2018).

### Haiti's Barriers to HT Management:

- Low HT awareness
- Lack of follow-up visits
- Poor medication supply
- Low accessibility
- Salt intake: **9x** greater than urged amount

### Addressing Risk Factors

Numerous studies have shown that CV NCDs and HT can be prevented by reducing behavior risk factors, such as elevated **salt** intake, **tobacco** use, **obesity**, unhealthy **diet**, physical **inactivity**, and **alcohol** use (Kontis et al. 2019). As salt is generally used as a food preservative in LICs, mass-media nutrition campaigns, community-level interventions, and clear sodium labeling have been found to reduce sodium intake (Subasinghe et al. 2016). There is also strong evidence that physical activity decreases HT risk and levels; physically active individuals with HT have been found to reduce their CVD mortality risk by 24% (women) and 30% (men) compared to inactive individuals (Pescatello et al. 2019).

### Early Detection

Early detection of hypertension is very important for mitigating the development of stroke and heart disease (Ibrahim & Damasceno, 2012). Incorporating **HT screening** and treatment into **primary care** facilities in addition to **community-level programs** has been shown to increase HT awareness, detection, and prevention (Kontis et al. 2019). Mendis et al. 2010 found that only 2% of individuals had to be referred to additional care when HT was incorporated into primary care. Similar to HIV care, evidence shows that there are no significant drops in patient outcomes or quality of care when HT care services are delivered by **non-physicians health workers (NPHW)** (Anand et al. 2019); numerous studies find that mean blood pressure even slightly improved under nurse-led HT care (Ogedegbe et al. 2014).

## III. General Gaps in Existing Research

In addition to specific limitations of current research highlighted after the recommended policies, there are a number of overall gaps in existing research relevant to Haiti's health situation:

1. Cost-effective, best-practice **structural interventions** that address **upstream drivers** of HIV infection risks, such as poverty or lack of education (Pettifor et al. 2012).
2. The cost-effectiveness, efficiency, and feasibility of using **solar powered cold storage systems** to strengthen Haiti's vaccination cold chain system (Tohme et al. 2017).
3. Evidence base (from systematic reviews of RCTs) and cost effectiveness for the use of **digital health systems** to increase vaccination coverage as well as other treatment and appointment reminders in low income settings (Sondaal et al. 2016; Ibrahim & Damasceno 2012).



# Policy Recommendations

## HIV / AIDS

### Task-Shifting ART Care

- Following the WHO recommendation of task-shifting HIV AIDS care to non-physicians (WHO, 2007), there is increasing evidence demonstrating the benefits (e.g. cost-effectiveness, increased accessibility) of **task-shifting antiretroviral therapy** (ART) to NPHW (Kredo et al. 2014; Callaghan et al. 2010).
- As Haiti spends the vast majority of its healthcare budget on personnel and faces a lack of physicians, training NPHW to provide home- or community-based ART training should be prioritized (Kredo et al. 2014).
- While there is a considerable evidence base supporting **nurse-led ART**, further research (systemic reviews in particular) is needed into the efficacy of shifting ART care to lay people (Mbeye et al. 2017).

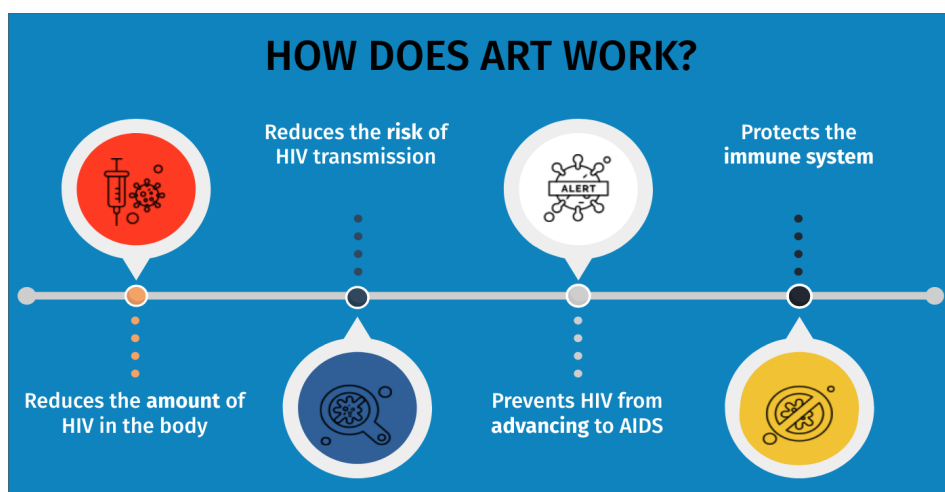


Fig. 3: Overview of ART (own creation)

### Using Multi-level Interventions to Increase Awareness

- Due to low HIV prevention awareness among Haitian youths, multi-level interventions may best increase knowledge and reduce risk behavior (Krishnaratne et al. 2016).
- **Comprehensive Sexuality Education** should be implemented in school curriculums with information on sexually transmitted infections, gender equality, and gender identity to reduce risk behavior (Fonner et al. 2014).
- As school enrollment is low in Haiti, behavior interventions should be coupled with **peer-education** and **community-based interventions**, such as condom distribution (Chen et al. 2020).
- Still, behavioral prevention interventions may be less effective in reducing overall HIV prevalence and should be combined with structural interventions addressing stigma, mental health, and ART retention (Krishnaratne et al. 2016).



## NCDs

## Community-based Control: Hypertension and Obesity

### Salt Reduction Interventions

- Mass media educational campaigns coupled with food product reformulation and explicit sodium labeling should be implemented at population and community wide levels (Aminde et al. 2018).

### Healthy, Active Lifestyle Interventions

- Behavioral interventions should be implemented in school and community settings to promote DASH (Dietary Approaches to Stop Hypertension) eating habits, emphasizing its effectiveness in reducing blood pressure in individuals with and without HT (Filippou et al. 2020).
- Such programs should also promote the health benefits of physical activity for individuals with HT, pre-HT, and without HT (Pescatello et al. 2019).

## Broadening Coverage for Hypertension

- Providing **culturally sensitive, protocol-based** hypertension care overseen by NPHW at a community or household level is a cost-effective way to prevent hypertension and cardiovascular NCDs (Heller et al. 2019; Laurant et al. 2018).
- Increasing **Hypertension screening** at facility, community, and household levels should be a main priority (Anand et al. 2019).
- NPHW should receive **in-service training** for blood pressure screening in addition to treatment and medication prescribing (Ogedegbe et al. 2014).

## Integrating NCD Care into HIV AIDS Platforms

- Haiti largely lacks national and external investment in NCD care in addition to exhibiting poor infrastructure systems (Achwoka et al. 2020). Thus, NCD care (hypertension in particular) should be integrated into existing primary care systems where **vertical infrastructure** to combat HIV AIDS already exists (Ibrahim & Damasceno 2012).
- Integrating NCD care into HIV infrastructure allows for **cost-effective NDC screening, detection, and treatment** (Njuguna et al. 2019). Such platform integration should include nurse training in NCD diagnosis and care, in addition to volunteer training in home-based blood pressure and glucose level screenings (Duffy et al. 2017).
- There is evidence that integrating HIV and NCD healthcare platforms not only increases early NCD detection, but can reduce mortality due to HIV positive persons contracting NCDs (Haregu et al. 2011).
- While the evidence base is growing, Fig 2. illustrates that more randomized control trial data is needed to improve existing policy recommendations.

## Increasing Childhood Pneumococcal Conjugate Vaccination

- As young children are particularly vulnerable to lower respiratory infections, childhood immunization should be prioritized (De Oliveira et al. 2016). Due to the **high burden of pneumonia**, the newly established Pneumococcal 13-valent Conjugate Vaccine (**PCV13**) vaccination campaign should be strengthened in addition to increased infant screening for risk signs (Alicino et al. 2017).
- This should be done in tandem with increasing current ***H influenzae* type b** and **rotavirus vaccination** efforts (Bhutta et al. 2013).

## Promoting Risk Reduction Behavior

Interventions that reduce LRI risks (see Fig. 4) should be prioritized (Bhutta et al. 2013). In particular, evidence supports the efficacy of the following interventions:

### Exclusive breast feeding > 5-6 months

- Mass-media, facility- and community-based education interventions should be established to promote exclusive breast feeding for at least 5-6 months, as evidence shows that combined individual and group counseling increases exclusive breast feeding rates (Lamberti et al. 2013).

### Zinc Supplementation

- As zinc deficiency is most prevalent in children under 5 in lower-income settings, zinc supplements should be administered to children between 2 month and 5 years of life to reduce LRI risks (Lassi et al. 2016).

### Improved Water, Sanitation, Hygiene (WaSH Services)

- Education interventions should be implemented in primary schools to increase awareness and practice of personal hygiene (hand washing with soap, sanitizer) (Joshi & Amadi 2013). Hygiene education interventions should be combined with hygiene supply-based interventions to administer improved water source, sanitation, and hand washing materials to primary schools (Jasper et al. 2012).

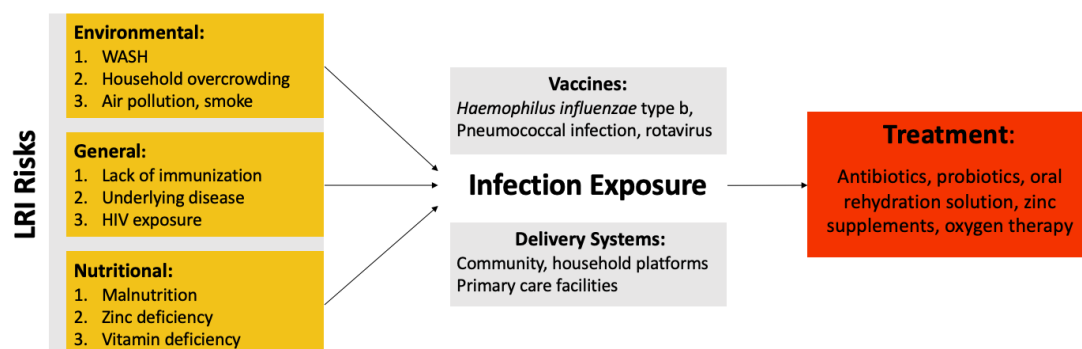


Fig. 4: Simplified Overview of LRI Intervention Framework (based on Bhutta et al. 2013)



# References

## Image References:

Haiti. 2018. Retrieved from: <https://internationalmedicalcorps.org/country/haiti/>

"New Investments in Healthcare". 2017. Retrieved from <https://cmmb.org/u-s-government-announces-new-investments-haitian-health-services/>

"For Haiti's health care, a Virtual Boost". 2012. Retrieved from <https://www.caribjournal.com/2012/05/18/for-haitis-health-care-a-virtual-boost/>

US Embassy Haiti. 2017. Delmas 75 clinic Haiti. Retrieved from <https://ht.usembassy.gov/u-s-government-announces-new-investments-haitian-health-services/delmas-75-clinic/>

## Text References:

Achwoka, D., Mutave, R., Oyugi, J. O., & Achia, T., (2020). Tackling an emerging epidemic: The burden of non-communicable diseases among people living with hiv/aids in sub-saharan africa. *Pan African Medical Journal*, 36. doi:10.11604/pamj.2020.36.271.22810

Alicino, C., Paganino, C., Orsi, A., Astengo, M., Trucchi, C., Icardi, G. and Ansaldi, F., (2017). The impact of 10-valent and 13-valent pneumococcal conjugate vaccines on hospitalization for pneumonia in children: A systematic review and meta-analysis. *Vaccine*, 35(43), pp.5776-5785.

Aminde, L.N., Takah, N., Zapata-Diomed, B. et al. (2018). Primary and secondary prevention interventions for cardiovascular disease in low-income and middle-income countries: a systematic review of economic evaluations. *Cost Eff Resour Alloc* 16, 22. <https://doi.org/10.1186/s12962-018-0108-9>

Anand, T., Joseph, L., Geetha, A., Prabhakaran, D. and Jeemon, P., (2019). Task sharing with non-physician health-care workers for management of blood pressure in low-income and middle-income countries: a systematic review and meta-analysis. *The Lancet Global Health*, 7(6), pp.e761-e771.

Bhutta, Z., Das, J., Walker, N., Rizvi, A., Campbell, H., Rudan, I. and Black, R., (2013). Interventions to address deaths from childhood pneumonia and diarrhoea equitably: what works and at what cost?. *The Lancet*, 381(9875), pp.1417-1429.

Callaghan, M., Ford, N. and Schneider, H., (2010). A systematic review of task- shifting for HIV treatment and care in Africa. *Human Resources for Health*, 8(1).

Chen, D., Luo, G., Meng, X. et al. (2020). Efficacy of HIV interventions among factory workers in low- and middle-income countries: a systematic review. *BMC Public Health* 20, 1310. <https://doi.org/10.1186/s12889-020-09333-w>

de Oliveira, L., Camacho, L., Coutinho, E., Martinez-Silveira, M., Carvalho, A., Ruiz-Matus, C. and Toscano, C., (2016). Impact and Effectiveness of 10 and 13-Valent Pneumococcal Conjugate Vaccines on Hospitalization and Mortality in Children Aged Less than 5 Years in Latin American Countries: A Systematic Review. *PLOS ONE*, 11(12), p.e0166736.

Duffy, M., Ojikutu, B., Andrian, S., Sohng, E., Minior, T. and Hirschhorn, L., (2017). Non-communicable diseases and HIV care and treatment: models of integrated service delivery. *Tropical Medicine & International Health*, 22(8), pp.926-937.

Fene, F., Ríos-Blancas, M. J., Lachaud, J., Razo, C., Lamadrid-Figueroa, H., Liu, M., Lozano, R. (2020). Life expectancy, death, and disability in Haiti, 1990-2017: A systematic analysis from the Global burden of Disease STUDY 2017. *Revista Panamericana De Salud Pública*, 44, 1. p.2020.136



Filippou, C. D., Tsioufis, C. P., Thomopoulos, C. G., Mihas, C. C., Dimitriadis, K. S., Sotiropoulou, L. I., Tousoulis, D. M. (2020). Dietary Approaches to Stop Hypertension (DASH) Diet and Blood Pressure Reduction in Adults with and without Hypertension: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Advances in Nutrition*. doi:10.1093/advances/nmaa041

Fonner, V., Armstrong, K., Kennedy, C., O'Reilly, K. and Sweat, M., (2014). School Based Sex Education and HIV Prevention in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis. *PLoS ONE*, 9(3), p.e89692.

Freeman, M. C., Stocks, M. E., Cumming, O., Jeandron, A., Higgins, J. P., Wolf, J., Curtis, V. (2014). Systematic review: Hygiene and health: Systematic review of handwashing practices worldwide and update of health effects. *Tropical Medicine & International Health*, 19(8), 906-916. doi:10.1111/tmi.12339

Haregu, TN, Oldenburg, BF, Setswe, G, Elliott, J & Nanayakkara, V. (2012). 'Epidemiology of comorbidity of HIV/AIDS and non-communicable diseases in developing countries: a systematic review', *The Journal of Global Health Care Systems*, vol. 2, no. 1, pp. 1 - 12.

Healthpolicyproject.com (HPP), (2021). [online] Retrieved from: <[https://www.healthpolicyproject.com/pubs/7887/Haiti\\_HFP.pdf](https://www.healthpolicyproject.com/pubs/7887/Haiti_HFP.pdf)>

Heller, D., Kumar, A., Kishore, S., Horowitz, C., Joshi, R. and Vedanthan, R., (2019). Assessment of Barriers and Facilitators to the Delivery of Care for Noncommunicable Diseases by Nonphysician Health Workers in Low- and Middle-Income Countries. *JAMA Network Open*, 2(12), p.e1916545.

Ibrahim, M. M., & Damasceno, A., (2012). Hypertension in developing countries. *The Lancet*, 380(9841), 611–619. doi:10.1016/s0140-6736(12)60861-7

Joshi, A., & Amadi, C. (2013). Impact of water, sanitation, and hygiene interventions on improving health outcomes among school children. *Journal of environmental and public health*, 2013, 984626. <https://doi.org/10.1155/2013/984626>

Joshi, R., Alim, M., Kengne, A. P., Jan, S., Maulik, P. K., Peiris, D., & Patel, A., (2014). Task shifting for non-communicable disease management in low and middle income countries--a systematic review. *PLoS ONE*, 9(8), e103754. doi:10.1371/journal.pone.0103754

Kontis, V., Cobb, L. K., Mathers, C. D., Frieden, T. R., Ezzati, M., & Danaei, G., (2019). Three public health Interventions could Save 94 million lives in 25 years. *Circulation*, 140(9), 715-725. doi:10.1161/circulationaha.118.038160

Kredo, T., Adeniyi, F., Bateganya, M. and Pienaar, E., (2014). Task shifting from doctors to non-doctors for initiation and maintenance of antiretroviral therapy. *Cochrane Database of Systematic Reviews*, (7).

Krishnaratne, S., Hensen, B., Cordes, J., Enstone, J. and Hargreaves, J., (2016). Interventions to strengthen the HIV prevention cascade: a systematic review of reviews. *The Lancet HIV*, 3(7), pp.e307-e317.

Lamberti, L., Zakarija-Grković, I., Fischer Walker, C., Theodoratou, E., Nair, H., Campbell, H. and Black, R., (2013). Breastfeeding for reducing the risk of pneumonia morbidity and mortality in children under two: a systematic literature review and meta-analysis. *BMC Public Health*, 13(Suppl 3), p.S18.

Lassi ZS, Moin A, Bhutta ZA. (2016). Zinc supplementation for the prevention of pneumonia in children aged 2 months to 59 months. *Cochrane Database Syst Rev*. 12(12):CD005978. doi: 10.1002/14651858.CD005978.pub3. PMID: 27915460; PMCID: PMC6463931.







Mbeye, N. M., Adetokunboh, O., Negussie, E., Kredo, T., & Wiysonge, C. S. (2017). Shifting tasks from pharmacy to non-pharmacy personnel for providing antiretroviral therapy to people living with hiv: A systematic review and meta-analysis. *BMJ Open*, 7(8). doi:10.1136/bmjopen-2016-015072

Mendis S, Johnston SC, Fan W, et al. (2010). Cardiovascular risk management and its impact on hypertension control in primary care in low-resource settings: a cluster-randomized trial. *Bull World Health Organ*;88:412–19

Njuguna, B., Vorkoper, S., Patel, P., Reid, M., Vedanthan, R., Pfaff, C., Park, P. H., Fischer, L., Laktabai, J., & Pastakia, S. D. (2018). Models of integration of HIV and noncommunicable disease care in sub-Saharan Africa: lessons learned and evidence gaps. *AIDS (London, England)*, 32 Suppl 1(Suppl 1), S33–S42. <https://doi.org/10.1097/QAD.0000000000001887>

Ogedegbe, G., Gyamfi, J., Plange-Rhule, J., Surkis, A., Rosenthal, D., Airhihenbuwa, C., Iwelunmor, J. and Cooper, R., (2014). Task shifting interventions for cardiovascular risk reduction in low-income and middle-income countries: a systematic review of randomised controlled trials. *BMJ Open*, 4(10), p.e005983.

Pan American Health Organization (PAHO). (n.d.). Haiti. Retrieved from: <https://www.paho.org/salud-en-las-americas-2017?p=4110>

Pescatello, L. S., Buchner, D. M., Jakicic, J. M., Powell, K. E., Kraus, W. E., Bloodgood, B., Piercy, K. L., (2019). Physical activity to prevent and treat hypertension: A systematic review. *Medicine & Science in Sports & Exercise*, 51(6), 1314-1323. doi:10.1249/mss.0000000000001943

Pettifor, A., MacPhail, C., Nguyen, N. and Rosenberg, M., (2012). Can Money Prevent the Spread of HIV? A Review of Cash Payments for HIV Prevention. *AIDS and Behavior*, 16(7), pp.1729-1738.

Piper JD, Chandna J, Allen E, Linkman K, Cumming O, Prendergast AJ, Gladstone MJ. (2017). Water, sanitation and hygiene (WASH) interventions: effects on child development in low- and middle-income countries. *Cochrane Database of Systematic Reviews*. 3. Art. No.: CD012613.

Subasinghe, A., Arabshahi, S., Busingye, D., Evans, R., Walker, K., Riddell, M., & Thrift, A. (2014). Salt and hypertension in rural and urban populations of low to middle income countries: A systematic review and meta-analysis. *Journal of Nutrition & Intermediary Metabolism*, 1(23). doi:10.1016/j.jnim.2014.10.077

Tohme, R., Francois, J., Cavallaro, K., Paluku, G., Yalcouye, I., Jackson, E., Wright, T., Adrien, P., Katz, M., Hyde, T., Faye, P., Kimanuka, F., Dietz, V., Vertefeuille, J., Lowrance, D., Dahl, B. and Patel, R., (2017). Expansion of Vaccination Services and Strengthening Vaccine-Preventable Diseases Surveillance in Haiti, 2010–2016. *The American Journal of Tropical Medicine and Hygiene*, 97(4\_Suppl), pp.28-36.

UNAIDS (2020). Haiti. Retrieved from <https://www.unaids.org/en/regionscountries/countries/haiti>

WHO. (2020). Haiti: WHO and UNICEF estimates of immunization coverage: 2019 revision. Retrieved from: [https://www.who.int/immunization/monitoring\\_surveillance/data/hti.pdf](https://www.who.int/immunization/monitoring_surveillance/data/hti.pdf)

WHO. PEPFAR. UNAIDS. (2007). World Health Organization; Geneva: 2007. Task shifting: rational redistribution of tasks among health workforce teams: global recommendations and guidelines.

Word Bank (WB). n.d. Hospital beds (per 1,000 people) - Haiti. Retrieved from: <https://data.worldbank.org/indicator/SH.MED.BEDS.ZS?locations=HT>

