Annex 1A Method Notes for Calculation of Cost of Essential Cancer Package

Supplemental material for: Gelband, H, P Jha, R Sankaranarayanan, C Gauvreau, and S Horton. 2015. Summary. In: Gelband, H, P Jha, R Sankaranarayanan, and S Horton, editors. 2015. *Cancer. Disease Control Priorities, third edition*, volume 3. Washington, DC: World Bank.

Method of Calculation of Cost of Essential Cancer Package at Three Income Levels; and Sources of Cost-Effectiveness Data; Sources and Assumptions for Cancer Interventions Cost Calculation (table 1.5)

Comprehensive Tobacco Control Measures

Uses Jha and colleagues' (2000) estimate of 0.1 percent of public spending on health for comprehensive measures, from World Bank World Development Indicators.

Palliative Care and Pain Control

Assumes that all those dying from cancer require three months (90 days) of pain control, of around 70 mg of opioids per day, according to Foley and colleagues (2006). Assumes the cost of opioids in low- and lower-middle income countries is US$0.16 per 10mg (from De Lima and colleagues (2014)), and in upper-middle-income countries is US$0.06, and that cost of other drugs to manage side effects are US$0.15 per day (estimated from Foley and colleagues 2006). The cost per cancer death is calculated. The numbers of cancer deaths (all cancers) are from GLOBOCAN 2012 (http://www.iarc.fr), using rates for Nigeria (representing demographic pattern in Sub-Saharan Africa), India (representing lower-middle-income countries), and Brazil (representing upper-middle-income countries).

Hepatitis B Virus Vaccination

Uses cost per dose of US$0.67 (UNICEF price) for dose integrated with DPT, assuming three doses (no birth dose), multiplied by number of births (i.e., does not allow for neonatal and early infant mortality). The cost of a separate vaccine is lower but increases the time requirements for dose administration. No additional supply costs are added, assuming this can simply be added on to an existing delivery infrastructure. The vaccine costs are not inflated to 2012 US$, since vaccine prices do not increase steadily year-by-year but are subject to periodic changes. Assume 100 percent coverage. Difference among regions is due to different birth rates.

Promote Early Diagnosis and Treat Early Stage Breast Cancer

Authors' estimate based on data for cervical and breast cancer for Karnataka as estimated by Rao Seshadri and colleagues (2014).

HPV Vaccination

Assumes a cost per vaccinated girl of US$20 for low- and lower-middle income countries (Gavi pilot is based on US$5.00 per dose, three doses per vaccinated girl), for a one-year cohort of girls ages 10-14 years. Part of this cost might be subsidized from international funds via Gavi. The cost per vaccinated girl in upper-middle income countries is US$50, based on dose price to Pan American Health Organization (PAHO) countries of approximately US$12-US14.

Screen and Treat Pre-Cancerous Lesions and Early Stage Cervical Cancer

Uses cost of screening (with visual inspection with acetic acid [VIA]) and treating with either cryotherapy at a district hospital, or LEEP (loop electrosurgical excision procedure) as required, for women ages 30-39 years who are screened once per lifetime, for Sub-Saharan Africa from Mvunduru and Tsu (2014). The cost was US$3.33 per woman screened, in US$ 2012 (includes the treatment cost for the smaller fraction of women needing treatment) and assumes coverage of 80 percent. Assumes that screening occurs at a health unit or similar local facility, cryotherapy treatment occurs at district hospital, and LEEP at a regional hospital; requires a minimum of two visits for screen-and-treat. The cost also includes amortization of equipment required for treatment procedure. The costs for India are from Rao Seshadri and colleagues (2014). The cost for Brazil is three times higher based on similar ratio for health sector salaries from WHO-CHOICE.

Treat Selected Childhood Cancers

Uses estimate of US$0.03 per capita for low- and lower-middle income countries, US$0.09 for Brazil (i.e., three times higher); authors' estimate.

Ancillary Services

Estimate that system strengthening costs are 50 percent of costs of individual components and are spent on items such as expanded laboratory and diagnostic capacity, quality control, and training (Jha and Laxminarayan 2009). Typically, a substantial fraction of health costs cannot be allocated to individual diseases but is spent on these ancillary services.

References

De Lima, L., T. Pastrana, L. Radbruch, and R. Wen. 2014. Cross-Sectional Pilot Study To Monitor the Availability, Dispensed Prices, and Affordability of Opioids around the Globe. *Journal of Pain Symptom Management* 48: 649-59.e1.

Foley, K. M., J. L. Wagner, D. E. Joranson, and H. Gelband. 2006. Pain Control for People with Cancer and AIDS. In *Disease Control Priorities in Developing Countries,* 2nd ed., 981-93, edited by D. T. Jamison, J. Breman, A. R. Measham. Washington, DC: Oxford University Press and World Bank.

Jha, P., F. Paccaud, and S. Nguyen. 2000. Strategic priorities in tobacco control for governments and other agencies. In *Tobacco Control in Developing Countries*, edited by P. Jha and F. Chaloupka. Oxford: Oxford University Press.

Jha, P., and R. Laxminarayan. 2009. Choosing Health: An Entitlement for All Indians: Centre for Global Health Research.

Rao Seshadri S., P. Jha, P. Sati, C. Gauvreau, U. Ram, R. Laxminarayan. 2014. Karnataka's Roadmap to Improved Health: Cost Effective Solutions To Address Priority Diseases, Reduce Poverty and Increase Economic Growth. Toronto and New Delhi: Centre for Global Health, Toronto and Public Health Foundation of India, New Delhi.

Mvundura, M., and V. Tsu. 2014. Estimating the Costs of Cervical Cancer Screening in High-Burden Sub-Saharan African Countries. *International Journal of Gynaecology and Ob*stetrics 126: 151-55.