**Supplementary Text 2 Effect decomposition results**

*Elixhauser score of zero***: Table 4, Model 1** **and Model 2** show there was a total 25% and 26% excess mortality risk for rural/low-income patients compared to urban/high-income patients at Stage 0-III and Stage IV, respectively. The excess relative risk (ERR) of mortality for an individual due to the interacting effect of being rural low-income and *not* visiting a non-oncology specialists 1x/year was 0.23 and 0.16, for Stage 0-III and Stage IV, respectively (**INTRef**). The mediated interaction (**INTmed**) component is interpreted as the ERR of mortality for an individual due to both the interacting effect between being rural/low-income and not seeing a non-oncology specialist ≥1x/year, but also due to the effect that being rural/low-income has on the individual's likelihood of visiting a non-oncology specialist ≥1x/year and how that affects mortality (Stage 0-III: ERR 0.02, Stage IV 0.04; p<0.001). Pure indirect effect (PIE; pure mediation) is interpreted as the ERR of mortality resulting from the effect that being rural/low-income has on the individual's probability of seeing a non-oncology specialist and how that effect is reflected on the mortality for the individual (Stage 0-III ERR 0.04; Stage IV ERR 0.08). Interaction effects accounted for 96.8% of the total effect for Stage 0-III and 80.5% of the effects for Stage IV, while mediation effects accounted for 21% and 49%, respectively.

*Elixhauser score of one***: Table 4, Model 3** **and Model 4** show that among those with an Elixhauser comorbidity score of one, 35% and 40% of excess mortality risk for rural/low-income patients compared to urban/high-income patients at Stage 0-III and Stage IV, respectively, was explained by non-oncology specialist visits. The ERR of mortality for an individual due to the interacting effect of being rural/low-income and not having visited non-oncology specialists 1x/year was 0.25 and 0.19, for Stage 0-III and Stage IV, respectively (**INTRef**). The mediated interaction (**INTmed**) component was 0.02 for Stage 0-III and 0.05 for Stage IV, p<0.001). The pure indirect effect (PIE; pure mediation) was 0.04 for Stage 0-III and 0.10 for Stage IV. Interaction effects accounted for 76.9% of the total effect for Stage 0-III and 60.8% for Stage IV, while mediation accounted for 21% and 49%, respectively.

*Elixhauser score of two or more***: Table 4, Model 5** **and Model 6** show there was a total 34% and 26% excess mortality risk for rural/low-income patients compared to urban/high-income patients at Stage 0-III and Stage IV, respectively. The ERR of mortality for an individual due to the interacting effect of being rural low-income and not having visited non-oncology specialists 2x/year was 0.25 and 0.16, for Stage 0-III and Stage IV, respectively. The mediated interaction (**INTmed**) component was 0.06 for Stage 0-III and 0.07 for Stage IV, p<0.001). The pure indirect effect (PIE; pure mediation) was 0.05 for Stage 0-III and 0.06 for Stage IV. Interaction effects accounted for 92.1% of the total effect for Stage 0-III and 87.0% for Stage IV, while mediation accounted for 32% and 28%, respectively.