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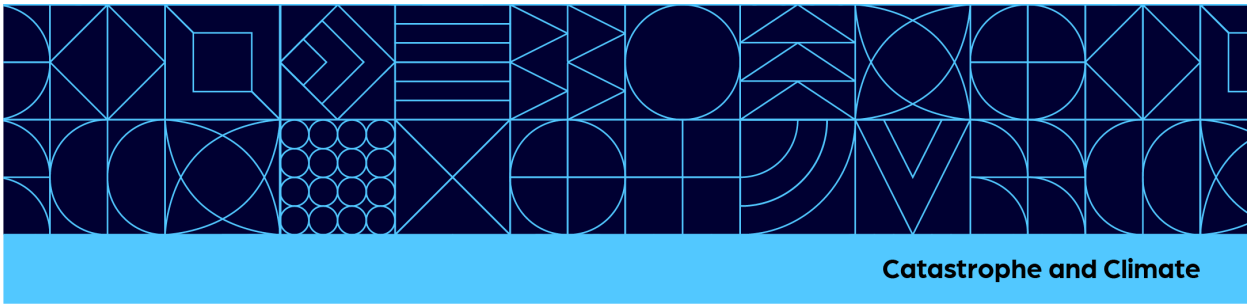

气候异常对美国死亡率与健康格局的长期影响

执行摘要

本报告建立了一个以美国为重点、具有政策参考价值的分析框架，用于量化厄尔尼诺-南方涛动（ENSO）异常对公共健康的影响。该框架以分死因死亡率为主要结果变量，采用分布滞后计量模型，并辅以生命表归因法和经济估值方法。利用这一框架，能够衡量历史数据中的短期影响和持续效应，将预期寿命变化分解到具体死因，对福利损失进行量化估算，并预测不同气候路径下的未来健康负担。

主要发现包括三个方面。第一，厄尔尼诺现象持续抑制主要疾病的死亡率改善，尤其是循环系统疾病和外部原因，且这种影响在中老年人群中更为突出。第二，1982-83 年和 1997-98 年的厄尔尼诺事件造成了显著的预期寿命损失和数万亿美元的社会福利损失，这些损失主要集中在循环系统疾病。第三，在厄尔尼诺-南方涛动变动增强的情况下，从本世纪中叶到世纪末的预测表明，美国预期寿命的改善将被大幅削弱，且在更高排放情景下，不确定性随之增大。

主要结论和启示总结如下：

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- 机制解读。厄尔尼诺与健康之间的关联模式，与气候和行为路径相一致：一方面，高温高湿压力及空气质量下降增加了心血管疾病风险；另一方面，环境和系统性压力导致伤害及外部原因死亡率上升。这种影响具有持续性，表明厄尔尼诺的健康负担会延续到事件窗口之外，而不会因死亡率改善的快速反弹而被完全抵消。

- 学术定位与精算启示。以美国为基础的研究曾报道过厄尔尼诺-南方涛动与传染病住院及流感死亡率之间的关联，但这些发现多为零散且仅针对特定疾病。本研究将这一工作扩展为一个统一的、量化的全国性风险模型，将分死因死亡率分析、基于情景的预测以及经济估值与传统精算框架相结合。它为精算行业提供了一个量化的证据基础，有助于理解气候异常如何影响人群死亡率假设、健康轨迹和保险风险敞口。

- 细化分析与归因。通过预期寿命变化的分解和对子原因进行分析（例如循环系统中的心脏病、外部原因中的交通事故），本研究识别了主要的因果路径，并展示了特定年龄的脆弱性如何从当期效应向五年累计影响。这些见解使精算师和医疗系统规划者能够在气候风险情景下完善压力测试框架、长寿风险模型和资本充足率预测。

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