



# The Dust Bowl in the US: An Analysis Based on Current Environmental and Clinical Studies



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## ABSTRACT

The Dust Bowl occurred in the Central Plains states in the United States between 1930 and 1940. Prolonged drought, intense recurrent dust storms and economic depression had profound effects on human welfare. The causes included increased farming on marginal land, poor land management, and prolonged drought. There was a significant increase in the number of cases of measles, increased hospitalization for respiratory disorders and increased infant and overall mortality in Kansas during the Dust Bowl. Recent scientific studies have demonstrated that dust transmits measles virus, influenza virus and *Coccidioides immitis*, and that mortality in the United States increases following dust storms with 2-3-day lag periods. Advances in technology have provided information about the composition of dust and the transfer of microbial pathogens in dust and provided the framework for reducing the economic and health consequences of the next prolonged drought in the United States.

**Key Indexing Terms:** Dust Bowl; History; Dust characteristics; Weather; Drought; Microbial pathogens. [*Am J Med Sci* 2018;356(2):90–96.]

## INTRODUCTION

The Dust Bowl was a natural disaster that brought misery and misfortune to the Great Plains region of the United States and Canada between the years 1930 and 1940. In concert with the economic catastrophe of the Great Depression, the Dust Bowl was responsible for numerous deaths and unprecedented migration away from the region.<sup>1</sup> This review recounts the history of the Dust Bowl, considers recent advances in technology and scientific studies which help us understand the causes and the health consequences of the Dust Bowl, and makes some recommendations which might be applicable to future dust storms caused by climate changes and other environmental factors.

## OVERVIEW

The phrase “Dust Bowl” was likely coined by journalist Robert Geiger in his reporting for the Associated Press on the massive Black Sunday storm of April 14, 1935, and it has come to refer to both the numerous dust storms that ravaged the region as well as the roughly bowl-shaped geographic area that they affected the most: southeastern Colorado, southwestern Kansas, the Oklahoma and Texas panhandles and northeastern New Mexico (Figure 1).<sup>2</sup>

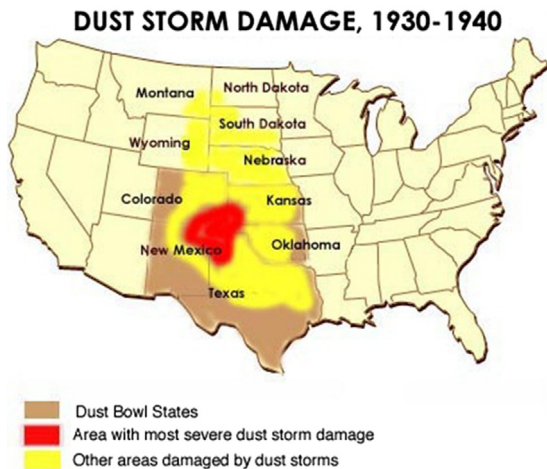
A number of agricultural, climatological and socio-economic factors converged to create the conditions in which these storms flourished. Increased migration to the Great Plains in the decades prior to the 1930s meant that more and more acres of prairie grassland were

developed into farmland. Increased farming and ranching depleted millions of acres of deep-rooted natural grasses and brush that traditionally kept topsoil in place in the region. In turn, droughts and unusually high temperatures in the 1930s enabled this dry, loose topsoil to blow across the plains in a primarily easterly direction with gusts up to 100 miles per hour. These storms became so widespread and destructive because, “although a wind of thirty miles per hour was often necessary to start soil movement on the best lands, once it began to blow, a wind velocity of less than half that figure could easily stir soil into the air.”<sup>3</sup> Unmoored, this eroded topsoil blew into homes through windows and wooden slats and destroyed once-productive farms (Figure 2). Writing for *The New Republic* in May, 1935, Avis D. Carlson described the human effects of these storms:

The impact is like a shovelful of fine sand flung against the face. People caught in their own yards grope for the doorstep. Cars come to a standstill, for no light in the world can penetrate that swirling murk.

Dust masks are snatched from pockets and cupboards. But masks do not protect the mouth. Grit cracks between the teeth, the dust taste lies bitter on the tongue, grime is harsh between the lips....

In time the fury subsides. If the wind has spent itself, the dust will fall silently for hours. If the wind has



**FIGURE 1.** Dust Bowl area. <http://pathfinderexample.wikispaces.com/Maps>. Accessed January 10, 2018.

settled into a good steady blow, the air will be thick for days. During those days, as much of living as possible will be moved to the basement, while pounds and pounds of dust sift into the house.<sup>4</sup>

## CAUSES

Owing to a deficiency in records from the 19th and early 20th centuries, there is significant debate as to whether the “black blizzards” of this era were categorically more severe than dust storms of previous decades.<sup>2</sup> Although dust storms are common on the Great Plains, these particular storms were exacerbated by the unrestricted and unmanaged use of farmland in the decades preceding 1930, higher demand for the crops these farms produced, and the advent of industrialized farming. More robust railroad infrastructure and government land policies that encouraged westward settlement and continuous agricultural cultivation, such as the



**FIGURE 2.** Dust Storm in Spearman, Texas. Dust storm approaching Spearman, Texas, April 14, 1935, Credit: US National Oceanic and Atmospheric Administration Source. <https://commons.wikimedia.org/w/index.php?search=dust+bowl&title=Special:Search&go=Go&searchToken=cn55ff2n1t0zko9sdog0fdyg1#/media/File:DustStormInSpearmanTexas19350414.jpg>. Accessed January, 10, 2018.

Enlarged Homestead Act of 1909, meant that more people than ever were living in the region when the Dust Bowl began.<sup>5</sup> As these farmers settled in the Great Plains, many did not adapt their traditional farming practices to their new, more arid environment. Additionally, high rainfall totals in the years before the Dust Bowl may have led newer settlers to overestimate how much value could be extracted from the land and in turn caused over-farming.

Moderate winters, prodigious rainfall totals, and greater prices for cotton, wheat, and grain sorghums in the 1920s encouraged even more agricultural cultivation in the area, in effect priming additional land for the eventual calamity.<sup>2</sup> McLeman notes that many of the new arrivals made poor land stewards. So-called “suitcase farmers” who operated speculative monoculture grain farms while living far away from the farms themselves may have also contributed to the region’s soil erosion: “the small size of Great Plains farms meant individual farmers had little influence over soil conservation in their local area and that abandoned farms became source points for erosion that adversely affected neighboring operators.”<sup>1</sup>

The introduction of tractors, combines and other mechanized farming implements also contributed to the increased farmland utilization in these areas. Without the benefit of modern farm management techniques, such as strip farming and crop rotation to prevent wind erosion, the topsoil of this period was tailor-made to produce large dust storms under the right atmospheric conditions. This triumvirate included high rainfall, high crop prices, and the development of mechanized farm equipment. As P. H. Stephens notes in his 1937 article “Why The Dust Bowl?” in the *Journal of Farm Economics*, “it was the concurrent happening of this triumvirate of favorable forces in the 1920s, any one of which would have caused notable expansion of cultivated land in this area that set the stage for the aggravated situation in the [1930s] drought.”<sup>2</sup>

## ECONOMIC AND SOCIETAL IMPACT

It is hard to overstate the impact the Dust Bowl had on American society and human geography. According to McLeman, “the Dust Bowl era saw the end of decades of rural population increase on the Great Plains and initiated a trend of rural population decline that persists to this day.”<sup>1</sup> Residents fled both the physical effects of incessant dust storms and the economic void those storms created. California received over 300,000 migrants from Oklahoma alone, and some estimate the number of people displaced by the Dust Bowl at over 3.5 million. Nine million acres of Great Plains farmland were abandoned, along with 10,000 homes in the High Plains subregion alone.<sup>6</sup>

As part of the Roosevelt administration’s New Deal efforts to address the Great Depression, many programs and agencies were organized to manage the ecologic

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